CHAPTER-II

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Cardiovascular diseases (CVD) are the prime cause of fatality in India as well as worldwide. In past 40 years, many researches were carried out in the direction of finding and identifying various risk factors associated with CVD. These researches targeted at identifying psychological risk factors and estimating the positive results of introduction of psychological interventions for heart problems. Investigations suggested a strong part of psychological factors in increasing incidences of CVD. Most recent researches suggest that emotional wellbeing is crucial to cardiovascular health. Thus, development of appropriate intervention program to improve emotional health of people with certain psychological risk factors has become a need of complete cardiac rehabilitation. Few years earlier until 1960s, clinicians focused only on the traditional advices and medicine and no due weightage is given to psychological risk factors. However, now a day’s more and more emphasis is given to psychological interventions to improve health and wellbeing of the patients. Thus, the need to come up with interventions incorporating psychological components to improve physical, emotional and social functioning of CVD patients cannot be discarded. Present section will attempt to group relevant studies under:

1. Psychological correlates of CVD:
   A. Emotions
   B. Alexithymia
   C. Type A behavior pattern
   D. Lifestyle and stress
   E. Emotional intelligence
   F. Optimism/ Life orientation

2. Psychological interventions and CVD

3. Psychological interventions and CVD in Indian researches
1. Psychological correlates of CVD

There is no doubt left regarding the association of psychological factors in the midst of augmented risk of cardiovascular mortality and morbidity. Recent large scale ‘community health disease’ studies have contributed a lot to enhance our knowledge for the mechanisms responsible for increasing CVD incidences. Psychological factors such as stress: at home or work place, adverse life events, financial crisis are many times found to play a major role in triggering health deteriorating conditions like hypertension & atherosclerosis development. Earlier researches were restricted to western population but with technological developments such studies are rapidly growing in number in eastern countries as well. The studies generate more and more evidences in support of role played by psychological risk factors towards development and progression of CVD among Asian populations (Ohira, 2010). In present scenario, where life has got technologically advanced and easy but mentally stressful and difficult, one can’t ignore psychological well-being for a disease free life. In a complete treatment program equal emphasis is given to both psychological factors (such as stress, social support, etc.) and conventional risk factors (for instance hypertension, obesity, smoking, etc.) (Jarvis, 2002).

A. Emotions and CVD

No doubt that emotions add color to our lives. Without emotions life will become monotonous. But on the other hand, ill effects of adverse emotional experiences on our physiology cannot be ignored. Repeated adverse emotional experiences may cause irreversible physiological alterations leading to progression of certain deadly diseases. Following studies revealed the major role played by emotions in CVD.

Around 20 years back, Moser & Dracup (1996) examined level of anxiety in 86 Myocardial Infarction patients inside 48 hours of their coming at the clinic, to determine its effect on incidence of subsequent in-hospital complications. Those with high anxiety level were approximately 5 times more probable to experience consequent difficulties and were related with greater than before, risk of having ischemic and
arrhythemic problems. The proposed system for the negative bodily effects of anxiety was too much neuroendocrinal stimulations. Definite undesirable consequences of sympathetic nervous system stimulation on the myocardium comprise augmented coronary arterial basal-vascular tone, greater than before platelet accumulation, increased intraluminal trimming forces and improved myocardial oxygen consumption secondary to hyper-dynamic, hemo-dynamics and reduced fibrillation threshold. Collectively such forces may possibly aggravate ischemia, promote malignant-ventricular arrhythmia and causes infarction and unexpected death.

In a similar kind of study, Elderen, Maes & Dusseldorp (1999) evaluated the consequences of coping strategies approach for anxiety, depression, and healthiness in 278 total patients (out of which 244 were male and 34 were female) with coronary heart disease. Assessments were done at 3 time points: after 1 month, after 3 months, and after 12 months following the cardiac event with the Coping Questionnaire for Coronary Patients to assess coping strategies and Positive and negative emotions were measured with: Spielberger’s State–Trait Anxiety Scale; Maastricht’s Questionnaire of essential exhaustion and depression; Medical Psychological Questionnaire for Heart Patients. They explored both longitudinal and cross-sectional relations. At every measurement point noteworthy negative cross-sectional relationship were established amid approach and well-being in patients, and noteworthy positive cross-sectional relation were established amid approach, on one hand, and negative emotions on another side. In the analysis of results well-being was found positively linked with avoidance and negatively linked with anxiety. Longitudinal analysis disclosed a negative association amid approach at initial assessments and anxiety and depression at subsequent assessments. However, a positive connection amid approaches at the initial 2 assessments and well-being at subsequent assessments was advocated. The probe into the results demonstrated the significance of coping and management of the distress caused by coronary events. They added that it is not favorable in the short term; but adopting approach strategy will be helpful to get rid of long-term emotional distress.

Another empirical study conducted by Denollet & Brutsaert (2001) examined the premise that treatment-associated modifications in emotional suffering may
elucidate the favorable consequence of treatment on prognosis. They administered nonrandomized clinical trial on 150 men with CHD. The results showed that there was no difference amid rehabilitation and controls regarding left ventricular ejections fraction (LVEF) or usual care. Results suggested decline in sufferings and deaths. Towards the end of three months trial, sixty four patients (approximately 43%) accounted for improvements and twenty two (15%) accounted decline in negative affects. Patients attending Rehabilitation recovered further and deteriorated below control group patients. It was reveled that rehabilitation was highly efficient in dropping sufferings. Following nine years record, fifteen patients died (13 cardiac deaths and 2 deaths of cancer patients). Deaths were found related with LVEF and decline in negative affects. Mortality rate was 17% (12 out of 72) for control group patients against 4% (3 out of 78) for rehabilitation group patients; moreover, rehabilitation program was successful in dropping mortality rate. They concluded that decline in negative affects is connected with an elevated long-standing death risk. Decline in negative affects explained the favorable effects of rehabilitation program on prognosis among patients of coronary heart disease. Results were found supportive for the proposed hypothesis in the study.

Moreover, Kiecolt-Glaser, McGuire, Robles & Glaser (2002) provided an extensive structure concerning negative affects to a variety of ailments whose inception and progression may be effected by the immunity system; also, inflammation found to be associated to a large variety of situations that progresses with age, such as arthritis, osteoporosis, CVD, diabetes, etc. In their papers they highlighted that the fabrication of pro-inflammatory cytokine influence firm circumstances directly fueled by negative affects and traumatic incidents of life. They emphasized on the role of negative emotions in lengthened infections and deferred wound curing. Reviews supported the fact that distress-associated immune dysregulations, possibly, one central system behind of an enormous and varied set of health threats related with negative affects. Resources of healthy relationships are good means to relieve negative affects and improve health by their constructive influences on immunity and endocrinal system regulations. It concluded that negative emotions pose a threat to good health and wellbeing of a person.
In light of previous researches, **Gallo, Ghaed, and Bracken (2004)** explored the evidences for the functions of affects and cognitive processes in the onset and development of coronary heart diseases (CHD). They used the framework, depicting association among emotions, cognitions and social environmental factors, as a guiding framework. They presented an outline of the physiological and behavioral systems that are supposed to connect various variables to CHD. They provided a comprehensive review highlighting the relationship of negative emotions to CHD and overall health. Research implicated positive affects and cognitive processes as potential defensive factors. On behalf of their work they suggested that hard work to recognize connects amid affects and cardiovascular health issues would profit from a deliberation of related social practices and extensive socio-cultural factors, for instance gender and socioeconomic status, in order to comprehend linkage among affects, cognitive processes and CHD. They emphasized on inferences of the study to revise psychosocial and cultural interventions followed in CHD researches and practices.

However, **Pressman and Cohen (2005)** examined evidences implying that positive emotions are closely related with bodily health and long life in common population, however results advocated mixed evidences for positive emotions foreseeing endurance in those living with disease. Numerous reviews of literature and meta-analytic studies concluded that subjective well-being anticipates healthiness and long life in normal population. Moreover, they recommended that positive conditions might be harmful to the wellbeing of patients with advanced disease and a pitiable fleeting prognosis, whereas favorable among patients suffering from diseases having superior vision of long-standing survival. Moreover, in very small number of cases extremely stimulated positive affects were detrimental to prompting cardiac attack.

Among recent studies, **Suls & Bunde (2005)** examined the literature based on a range of types of negative affects and cardiovascular diseases. They proposed that even though depression is over and over again linked to damaged cardiac health, but there is somewhat doubt on part of exact negative affects like anger which influences wellbeing in concurrence, in interface, or autonomously. They concluded that negative
affects may have a strapping role in onset of cardiovascular diseases as compared to its progression afterwards.

In a study, Nezlek & Kuppens (2008) examined how people use different emotion regulation strategies in routine and how these strategies are associated with every day emotional experiences and psychological adjustments. 68 men and 85 women, students of graduation who utilized the Internet service to give information towards the end of each day for three weeks, participated in the study. Each day for about three weeks, those who participated in the study explained the ways adopted by them to regulate emotions. Whatever they experienced was described by them using Beck’s depression inventory. Results revealed that reappraisal was adopted more frequently as compared to suppression, whereas suppressing positive affects was not as much repeatedly used as other 3 strategies. Moreover, regulation of emotions by adopting reappraisal strategy was established to be advantageous, as compared to regulation through suppression. They concluded that reappraisal of positive affects was connected with improved self-worth and psychological adjustments, opposite to this suppression was found to be linked with reduced positive affects, psychological adjustments and self-worth and greater than before negative affects. While evaluating the coefficients, they also found that the associations amid reappraisal and psychological adjustments and self-worth were arbitrated by positive emotions, while connections between suppressing self-worth and positive affects were found to be arbitrated by negative emotions.

In an individual research, Purdum (2010) studied the association among positive emotion, negative emotion, languishing, flourishing, and cardiovascular functioning on a sample of 501 participants for Phase I and 265 for Phase II. The sample for both Phase I and Phase II consisted of 58% Caucasian, 19% African American, 12% Hispanic, and 11% of other or unspecified ethnic background. It attempted to expand the scientific knowledge of psychological facilitators and stress buffers that can promote cardiovascular health on. Findings linked both flourishing and positive emotions to cardiovascular health in a way that regular experience of positive emotions had been found to have many cardiovascular benefits. Moreover, flourishers did not significantly
differ from languishers in regard to any of the measures of the cardiovascular functioning.

Later on, Diener & Chan (2011) reviewed seven types of evidences revealing high subjective wellbeing (e.g. Life satisfaction, hopefulness, and positive affects) promotes healthiness and long life. Potential longitudinal investigations of common population proved that a range of subjective well-being for instance positive emotions help to foresee healthiness and longevity controlled by health and socioeconomic conditions at baseline. However, accumulated evidences claimed that individual well-being increases time-span of the lives of persons suffering with definite ailments such as tumors, continue to remain controversial. On the other hand, extremely stimulated or overexcited positive emotions may possibly prove unfavorable to healthiness. Several topics for instance etiology, size effect, statistical controls and different forms of subjective well-being are debated. Cardiovascular literature attempts to make a distinction among the negative consequences of aggression against depression against nervousness. The evidences sustained that both aggression/hostility and depression, in addition to severe nervousness, are disadvantageous to cardiovascular health and wellbeing.

In a latest study, Eichstaedt, Schwartz, Kern, Park, Labarthe, Merchant, Jha, Agrawal, Dziurzynski, Sap, Weeg, Larson, Ungar & Seligman (2015) used verbal communication articulated on Twitter to illustrate group specific psychological correlates regarding age-accustomed deaths resulting from atherosclerotic heart diseases (AHD). Evidences supported particular fact that verbal communication prototypes revealing indifferent social bonding, non-engagement, and negative affects particularly rage are risk factors as compared to psychological well-being and positive feelings that appeared as defensive factors. Moreover, relationships continued to be significant following control of variables like wages and education. Cross-sectional model of regression showed that Twitter language highlights AHD mortality in more clear terms than other models based on 10 demographic, health risk and socioeconomic factors. It was easy and feasible by means of social media to capture psychological
The 3 chief discoveries were: foremost, verbal communication articulated on Twitter exposed numerous group specific psychological features that were notably associated with AHD death risks. Next, the use of anger as a negative sensation, non-engagement, and use of pessimistic-affiliation verbal communication was detrimental to augmented risk, on the other hand positive-emotion language was found protective. Third, Twitter verbal communication completely reports for and adds to AHD pertinent information in ten symbolically evaluated socioeconomic, demographic and health associated variables. As whole, outcomes suggested that verbal communication on Twitter may present plausible markers of group specific psychosocial health and well-being which may supplement additional ways of investigating cardiovascular mortality.

These studies suggested a strong relationship between emotions and CVD by revealing evidences in support of physiological reactions resulting from emotional triggers. By regulating emotional expressions the risk of cardiovascular diseases can be considerably reduced.

B. Alexithymia and CVD

Alexithymia also called emotional blindness is the inability on the part of a person to identify and express one’s emotional experiences. Many studies established a strong association between alexithymia and several chronic diseases, such as asthma, cancer, CVD, etc. Some of the studies are quoted below:

**Defourny, Hubin & Luminet (1977)** an expert group of researchers concluded that the inability to express or perceive emotions called alexithymia are characteristic of (Taylor, 1986) coronary prone personality. Such persons try to adjust themselves with the anxious mistrustful perception that they develop for the demands of society (Shipko, William & Nicholas, 1983). Trauma, no matter happened in early or late life results in permanently disturbed emotional responses which is a threat to mental and physical health of an individual (Krystal, 1978). Evidences suggest that the high levels of adrenal cortical hormones prove fatal to hippocampal brain cells (Sapolsky, Drey & McEwen, 1984). Moreover, studies also reveal that damaged, alexithymic, CVD prone
individuals lack in appropriate expression of instinctual patterns that are functional in the right hemisphere (Sacheim, Greenberg, Weiman, Gur, Hungerbhuler & Geschwind, 1982).

Similarly, Margarita, Donatas, Vytautas, (2003) concluded that alexithymia may effect morbidity or course of cardiovascular diseases by introducing behavioral risk factors to relieve stress by developing smoking habit. In fact, alexithymia is an autonomous and sovereign risk factor for many cases of CVD. Their study aimed at investigating probable link of alexithymia with the coronary risk factors. Coronary angiography confirmed the results that alexithymia leads to further narrowing of arteries in CHD patients. They assessed the self-rated alexithymia by means of the Toronto Alexithymia Scale (TAS-20) administered following angiography. Selected sample consisted of 166 males of middle age. They hypothesized that Alexithymia bears connection with relative risk factors for CHD and number of constricted arteries and segments with more than fifty percent obstruction. The statistical analysis of the data revealed soaring alexithymia in 22% of patients (N=39) with critical high blood pressure identification and in 48% of patients (N=44) devoid of it. The assessment of the mean scores for TAS-20 and number of patients assessed with elevated levels of TAS-20 scores revealed that alexithymia was notably associated with smoking behavior. However, alexithymia level was not found associated to consumption of cigarettes in a day. Around 40% patients with high cholesterol level (N=40) and 32% (N=32) with normal cholesterol level were evaluated as alexithymics. The study revealed that alexithymia may be found comparable among patients with CHD or with CHD and critical high blood pressure; and psychosomatic disorder. Besides this, it became clear that arterial blood pressure is alike among non-alexithymia or alexithymia patients at rest, but responding to stressors is more among alexithymia patients.

In another study, Kyung, Seung, Jang, Kyu & Sang (2004) observed the association among alexithymia, anger expression and coronary arterial stenosis in patients of coronary arterial diseases (CAD). The study was conducted on 143 patients with CAD (104 males and 39 females). Angiography was utilized to diagnose the severity of the disease. Psychological tools used to measure anger expression and alexithymia
were the anger expression scale and Toronto alexithymia scale (TAS-20). The group with greater level of stenosis (occluded by 75% or above) demonstrated significantly elevated levels of alexithymia as compared to the poor stenosis group (occluded below 25%). The multiple regression analysis of extend of stenosis too exposed that not considering age and gender, the CAD patients with advanced alexithymia were expected to demonstrate a larger intensity of stenosis. On the other hand, no statistically significant differences were established on either anger subscale scores among the groups. The end results advocated that alexitymia is related with the sternness of coronary arterial stenosis among coronary artery disease (CAD) patients. But, both anger inhibition and anger expression were not found related with the harshness of coronary arterial stenosis.

As reported in earlier researches, Neumann, Sollers, Thayer, Waldstein (2004) also reported substantiation for the hypo-arousal alexithymia model in the period of reactivity and hyper-arousal model in the period of recovery. The study was conducted on 80 female university students using Toronto alexithymia scale (TAS-26) to evaluate alexithymia and S Anger sub-scale of the state-trait anger expression inventory (STAXI) was used to determine state anger. Autonomic nervous system dysregulations throughout and following episodes of acute emotional distress were recommended as a potential physiological track linking alexithymia with cardiovascular diseases. The study examined the stress stimulated autonomic system reactivity and improvements as potential paths that acts as a bridge between alexithymia and cardiovascular diseases. The association of alexithymia to heart rate, blood pressure and several other similar cardiovascular health parameters taken from cardio-graphy (N = 80) and heart beat rate inconsistency (N = 40) was examined in rest and recovery phase in women aged 18–30 years, they were also assigned anger recall task. Results revealed that during anger recall, an association was found between alexithymia and considerably elevated heart beat rate and stroke indicator reactivity, and with marginally lowered blood pressure. Overall, the reaction patterns suggested dull sympathetic nervous system establishment and weakened vagal withdrawal. In fact, alexithymia level was found to be closely associated with slower diastolic blood pressure and faster projection in the recovery period showing declined sympathetic arousal and heightened vagal modulation.
Apart from previous studies, Mehling & Krause (2005) examined the connection of alexithymia level (insufficiency in emotional awareness component) with twelve months pervasiveness of low back pain (LBP) across different sections among 1180 San Franciscan travel operators. Toronto alexithymia scale (TAS-20) was used to assess alexithymia whereas LBP was evaluated in medical case history at the time of drivers’ relicensing exam. The end results maintain a connection of alexithymia with LBP. Out of total participants, 31.4% experienced LBP. The greater quartile score of alexithymia revealed strong association with twofold increased odds of LBP. Stronger association was seen in women than in men. The component “difficulty identifying feelings” illustrated highest connection with LBP.

According to neuro-imaging investigations, patients who had soaring alexithymia scores appeared to be poles apart from non-alexithymic patients as their rostral brain regions were significantly less active for reflexive affective responsiveness. The unusual responsiveness for negative emotions may be declined or raised. Reduced action was noticed among U.S. (Lane, 2000), Japanese and Germans, (Kano, 2003) researches. Affective deadening among patients of PTSD is sturdily related with alexithymia level (Badura, 2003) and influences disapprovingly the doings in the dorsal brain by means of induced inattentiveness to one’s personal affects or emotions.

Bokeriia, Golukhova, Polunina, Davydov, Kruglova (2008) assessed the consequences of levels of depression, alexithymia, anxiety and dysfunctional cognitions on heart beat rate (HR) and heart beat rate variability (HRV) in overall, 18 patients with anticipation of cardiac surgery. The results revealed that the alexithymic patients exhibited slow HR, but elevated cognitive performances which were linked with prominent HR two to three days prior surgery. Negative correlation was found between depression and HRV in the similar inclination particularly for state anxiety. The data was constant with earlier results of assorted reasonable effects of stress on HR control in cardiac patients and normal healthy persons in agreement to disparities in behavioral characteristics. These results support that comparatively distressing event, such as anticipation of cardiac surgery, influences HR and HRV unlikely in patients having unusual psychological characteristics. Final results revealed a linear and inverse
association between alexithymia and mean HR among patients, and the results were unfailing to investigations relating stress consequences to HR among alexithymics but healthy students. The connection was approving for alexithymics since prominent HR was again and again exhibited as a risk factor influential to overall morbidity and mortality.

However, Vanheule, Vandenbergen, Verhaeghe, Desmet, (2010) examined the association amid interpersonal issues and alexithymia in an overall sample consisting 155 patients getting primary care, out of which 52 patients were of chronic fatigue syndrome (CFS); 52 patients were of unrelieved auto-immune or cardiovascular diseases; and 51 patients were of trivial health conditions. The results of the study showed that CFS and patients of auto-immune or cardiovascular diseases have remarkably advanced alexithymia level than trivial health condition patients. The highlights of the research were that alexithymia level is positively correlated to bitter and isolated interpersonal relations; negatively correlated with self-forfeiting and excessively obliging in relations with others; and positively associated to nastiness and self-centeredness. Research findings revealed that CFS patients and unrelieved auto-immune or cardiovascular diseases patients showed no differences in interpersonal issues, and both groups demonstrated considerably extra interpersonal problems compared to patients with a trivial health condition.

In light of above mentioned evidences, Lee, Keeley & Reiter (2013) conducted a cross-cultural cohort investigation of patients (30-72 years in age) with diabetes attending an urban community health system and no cardiac heart disease events in last five years. Results showed mean CHD risk scores were 13.0% and 57.5% patients had eminent 10-years CHD risk of no less than 10%. Further, linear regression revealed that those who had developed good patient-physician relationship, received pharmacotherapy for psychological disorders, and showed emotional sensitivity had 28.5%, 25.3%, and 39.0% lesser CHD risks, respectively. Evidences thus suggested that non-conventional risk factors for CHD patients are capable of developing knowledge of CHD pathways and prove helpful in risk estimation, and also, explain reasons behind
emerging need to introduce changes in traditional intervention to improve clinical outcomes.

A latest study conducted by Bozkurt, Sunbul, Sunbul, Dalkilic, Cengiz, Kivrak & Durmus (2014) evaluated the levels of anxiety and somatic perception in patients with chest pain. The study was conducted on 51 patients with non-cardiac chest pain and 51 healthy controls using self-report based health anxiety inventory (HAI), somato-sensory amplification scale (SAS), and Toronto alexithymia scale (TAS). The result explained that the patient group had significantly higher scores on all three scales when judged against controls. Three scores were considerably greater among female patients as compared to males. Significant differences were assessed in all TAS subscale scores between two groups. Patients having greater than 50 scores, showed increased level of health anxiety. Researcher concluded that cardiac patients show elevated anxiety, certain somatic symptoms, and higher level of bodily sensations.

These studies helped to understand that how an emotional misery manifested in alexithymia is associated with cardiovascular diseases and other chronic diseases. These studies also suggested that improving upon alexithymia, incidences of chronic diseases can be significantly reduced.

C. Type A behavior and CVD

According to Friedman and Rosenman (1974) Type A behavior pattern is exemplified by an extremely entrenched and continuous battle to face authentic as well as anticipated difficulties enforced by experiences, other persons, and, in particular, by time. They suggested that Type A behavior corresponds to an attempt to reduce the primary feelings of uncertainty or self-disbelief. Sorry to say, such behaviors have a propensity to put a self-beating cycle in action. Type A individuals prefer extra demanding state of affairs and assess the circumstances as additionally challenging and taxing than in actuality they are; they assess their responses to such circumstances disapprovingly, rising the want for extra hostile responses. Such hostile responding put them in long-drawn-out contact with conditions that aggravate feelings of uncertainty, and repeats the same cycle.
In a variety of similar researches, the association between Type A behavior and CVD is empirically investigated. Some of these studies are illustrated in subsequent pages.

**Brand, Rosenman, Robert & Friedman (1976)** compared multi-variate predictions of coronary heart diseases (CHD) in Western Collaborative Group Study (WCGS) to the results of Framingham Study (FS). WCGS is a potential community health study based on a sample comprising 3,154 males (39-59 years in age) and employees of 10 corporations located in California. Clinically significant coronary heart diseases (CHD) happened to 257 males in a follow-up period of roughly 9 years. CHD risk is determined utilizing model of additive multiple logistics for risk factors: cholesterol, age, ECG status, systolic blood pressure, smoking and comparative bodily weight. The CHD risks level were obtained by means of logistic result resulting from WCGS data, were found extremely interrelated with calculated risk levels with Framingham study (FS) equations for the evaluated risk factors within period of 12-years follow-up. However, the empirical CHD events in the WCGS were not significantly diverse from the anticipated number of events ensuing from FS logistic equations, following rectification of follow-up durations. Multiple logistical analysis of relationship amid CHD frequency and behavioral patterns revealed roughly a relative risk of 1.9 and 2.1 for Type A contrasted against Type B for males lying in range 39-49 and 50-59 years in age, correspondingly. It was anticipated that taking away of the surplus risk allied with Type A behavior could result in a 31% diminution of CHD incidences in Western Collaborative Group Study populations.

Another study conducted by **Carita, Stephen, John, Bruno & Karen (1982)** examined the psycho-physiologic response of Type B and Type A persons, among CHD patients and non-CHD patients. Study was conducted on 58 adult male volunteers out of which 24 showed clinical history of myocardial infarction or diagnosed medically with angina pectoris (CHD patients) and remaining 34 had no history of coronary diseases during cardiac assessment (non-CHD). In the study, the entire population of participants had normo-tensive blood pressure at rest; among CHD patients, not even a
single subject was having β-adrenergic blockage prescription. Assessment of heartbeat rates (HR) and both, systolic as well as a diastolic blood pressure (SBP, DBP) was done at some point in a baseline phase and at the same time participants completed some complicated and tiresome mental assignments. All participants also completed the Structured Interviews for Type A and Type B assessment (SI) along with Jenkins’ Activity Survey (JAS). Outcomes pointed towards fact that free of Type A or Type B behavior, CHD patients showed higher DBP increases at times of performing experimental assignments as compared to non-CHD control participants. Type A participants showed signs of bigger assignment associated raises in SBP and DBP as compared to Type B, excluding alterations in HR among the groups. Moreover, Type A and Type B behavior assessment accomplished utilizing JAS were found not linked to participants’ SBP, DBP, and HR reactions, and not even SI and JAS identified Type A participants varied unfailingly from Type B participants on evaluates of assignment scores. On the whole, the outcomes revealed that increased cardiovascular responsiveness under constant worry may arbitrate affiliations linking CHD and behavioral factors.

Similarly, Manuck, Kaplan & Matthews (1986) reviewed more than 50 community health medicine, medical, and investigational researches based on behavioral effects on atherosclerotic progression and CHD. The preponderance of existing facts indicated that psycho-social variable have a noteworthy role in CHD. Moreover, Type A behavioral pattern was found to be the detrimental component in CHD. Practically every potential study of primarily physically fit persons and remedial alterations of Type A behavior were found capable in reducing risk of frequent non-fatal myocardial infarction (MI). In the middle of the majority researches of post MI patients and of individuals at a raised risk of CHD owing to increases in conventional risk factors, on the other hand, Type A was inefficient in predicting, respectively, reappearance of MI or primary clinically significant happenings. Furthermore, Type A persons showed highly wide-ranging coronary arterial atherosclerosis on angio-graphical report than Type B persons in marginal researches, and, commonly, only in those where Type A behavior was assessed using structured interview. Contrary to the internationally characterized Type A patterns, an elevated prospective for aggression and an incapability or reluctance to
communicate anger have appeared as important correlates of CHD in almost every community health and experimental study. The unswerving consequences recommended that an inclination towards aggression and rage, and the repressed expression of feelings corresponds to a "toxic" element of the Type A behavioral pattern. Also, studies indicated that higher level of stress as well as control of inadequate communal resources is extrapolative of CHD events. However, they added that the concept of stress, communal networks, societal hold up, and affiliations among these all these aspects, are not finely understood, conversely, much supplementary efforts are required to discover precise pathologic and defensive traits of social milieu.

In an empirical study, Slobodan & Svetlana (2002) studied the incidence of behavioral variations and heart diseases among patients to analyse the complications associated with psycho-somatic and somato-psychic influences. It was found that psychological factor counting despair; angst and aggression influences the growth, medical manifestations and heart diseases prognosis. They found that Type A behavioral pattern is an autonomous risk factor for the growth of coronary diseases comparable in influence to hypertension and smoking. A more significant communication was established connecting Type A behavioral patterns and age factor concerning relentlessness of atherosclerosis following adjustment of typical cardiac risk factors. Moreover, ameliorating distress showed improved sticking to treatment recommendation, for instance changing defense mechanism, prescription and presence at work out programs. They concluded that it is very critical to identify medically noteworthy level of pain both within hospital and following discharge from hospital, for patients specifically needing psychological interventions along with traditional cardiac rehabilitation.

Moreover, Yan, Liu, Matthews, Daviglus, Ferguson, Kiefe (2003) provided credible evidence for hostility as well as Type A factor, time urgency/impatience (TUI), are autonomously related with an almost twice rise in hypertension prevalence in an oversized populace based prospective section of young adults, unbiased on sex, race (black and white), and qualifications. Multivariable statistical approach assessed the impact of every psychosocial factor on risk associated with hypertension following alteration for demographical and other related psycho-social
factors which enabled the author in developing the case concerning involvements of TUI along with hostility for risk associated with hypertension are sovereign of one-another in addition to other factors which were controlled, however it doesn’t deal with the issue of combined effect of these risk factors. They emphasized that 84% increase in hypertension was seen in the group with top level of TUI or hostility. In such case, it suggested that interventions aimed at reducing impact of psycho-social risk factors would show improved impact on hypertension risk, in case the intervention aimed at individuals with higher level of both hostility and TUI. The study showed that psycho-social risk factors augment CVD risk, the existing evidences concerning physically credible systems which are expected to intercede connections linking psycho-social risk factors to CVD risks, and evidences from medical tryouts of medicinal and behavioral cures aiming psycho-social issues maintain the want for augmented development of investigations, implementation, pharmacological and behavior modification intervention that aim at dropping the adverse effects of psycho-social risk factors in developmental process in addition to prognosis of CVD.

Moreover, Kohli & Malhotra (2008) studied the interaction of Type A behavior pattern and emotional maturity in relation to CHD. Jenkins Activity Survey and Emotional Maturity Scale were administered on 200 subjects, aged 30 - 65 years that included 100 coronary heart patients and 100 healthy controls. Statistical analysis of scores revealed that type A behavioral pattern was highly frequent than type B in coronary heart disease patients (68% vs 32%) as compared to healthy controls (51% vs 49%). There was a significant correlation linking Type A behavioral pattern and total maturity scores among patients indicating more emotional immaturity among Type A individuals than healthy control group. The patients and controls significantly differed on Type A behavior pattern and total emotional maturity score. The elevated score on emotional maturity scale indicated higher level of emotional immaturity. Except for the social maladjustment factor of emotional immaturity, patients showed higher level of emotional instability, personality disintegration, emotional regression, and lack of independence as compared to healthy controls. They concluded that coronary heart disease is significantly linked with Type A behavioral pattern and emotional immaturity.
However, it is not the Type A behavior only but emotional immaturity linked with Type A behavioral pattern, which increases the susceptibility to coronary heart disease.

Likewise, Ikeda, Iso, Kawachi, Inoue & Tsugane (2008) examined the connection amid Type A behavior and risk associated with CHD prevalence inside a Japanese group of 86361 males and females belonging to age ranging between 40–69 years. They evaluated 4 characteristics of Type A behavioral pattern utilizing self-reports: competitive impel, speed, impatience, irritability and hostility. They established no evidence stating a connection connecting Type A patterns with CHD incidences. They discretely scanned Type A behavioral patterns pertaining to CHD risk among males and females. Distribution of Type A behavioral patterns scores was: 0 score, 1% in both males and females; 1 score, 2% among males and 3% among females; 2 score, 6% among males and 7% among females; 3 score, 12% among males and 15% among females; 4 score, 38% among males and 42% among females; 5 score, 16% among both males and females; 6 score, 12% among males and 9% among females; 7 score, 7% among males and 4% among females and 8 score, 6% among males and 3% among females. Participants were classified in 4 level groups of type A behavioral patterns on the basis of division of pooled index as: Very High (6–8 scores, 25% among males and 16% among females), High (5 score, 16% among males and 16% among females), Medium (4 score, 38% among males and 42% among females) or Low (0–3 scores, 21% among males and 26% among females). Males assessed with very high type A behavioral patterns were probably alcholics, existing smokers, hypertensive and likely to take part in bodily actions. They too revealed elevated level of perceived stress along with privileged employment. Females assessed with very high Type A behavioral patterns were too likely to smoke and consume alcohol, also accounted for high level of perceived stress as well as superior employments. Opposite to anticipation, Japanese males assessed with low level of Type A behavior come out to be at significantly augmented CHD risk. In contradiction to males, although, insignificant however, affinity for low risk of CHD incidences among females assessed with reduced level of Type A behaviors was observed. They concluded that Type A behavior doesn’t envisage CHD prevalence in inhabitants of Japan. Type B behavioral pattern manifested greater risk of CHD among
males. Their results suggested that cardio-toxic effects of Type A behavioral patterns are specific to gender and racially dependent.

In addition to previous studies, Wilmot, Edwardson, Achana, Davies, Gorely, Gray, Khunti, Yates & Biddle (2012) carried out an organized examination and meta-analysis to establish the connection of inactive lifestyle with CVD and diabetes risk and considered the all cause deaths in cross-sectional and prospective studies. They searched Embaze, Medline, and Cochrane Library database for texts concerning inactive lifestyle and health consequences. Facts were attuned for baseline incident frequency and collected with a casual-effect model. Eighteen studies were taken up, with around total sample of 794,577 subjects. Quality of the investigations varied from fair to good. When the utmost inactive lifestyle was compared to least inactive, the results revealed that the intervals and predictive effects were found significant only for diabetic patients. They concluded that inactive lifestyle is related with greater CVD risk, diabetes and all-cause deaths due to these diseases. The potency of this connection was very much reliable for diabetics.

A recent study by Stoll, Csaszar, Szoke, Bagdi (2014) systematically reviewed the literature to examine the significance of psychological evaluation and in supporting the patients experiencing CVD or undertaking cardiac treatments. In their concluding remarks they highlighted hopelessness, relentless apprehensions and related psycho-social characteristic risk factors for cardiac problem. These factors include stumpy socioeconomic condition, job related stress, chronic family history, social segregation, affective dysregulation, negative emotions and hostility. To identify and examine these factors is of extreme importance in a multidisciplinary patient care. Research evidences supported that only the hostile component of anger is truly harmful to cardiac health; also, average anger expression might be a protective factor for future CVD events. They added that psychological interventions for CVD patients are capable of improving anxiety level, blood pressure level, health associated life quality and awareness and contentment level.
Available research exposed the course of progression of CVD in type A personalities. Probable connection of the Type A behavioral patterns with a greater incidence of CVD is now well recognized.

D. lifestyle, Stress and CVD

Stress is professed by the greater part of cardiac population as an imperative reason behind their cardiac problems. Such beliefs are also widespread among common populations, and perplexity remains among health experts in respect of its function in the onset and progression of coronary heart diseases (CHD). Although, stress is one of the frequently used phrases, it bears no clear-cut explanation and can’t be voluntarily assessed. Stress, in general, established to consist of several elements that are assessable, and were studied, together with anxiety, depression, aggression, social segregation or poor social support, unrelieved life experiences; psycho-social work qualities and hostility. A systematic review of literature carried out by an expert work group of the ‘National Heart Foundation of Australia’ recognized fifteen studies presenting strong and unfailing evidences for social segregation or poor social supports and depression being sovereign risk factors for the onset and development of CHD (Bunker, Colquhoun, Esler, Hickie, Hunt, Jelinek, 2003) The prevalent reviews provided well-built and unswerving evidences for both the factors. However, evidences too supported that facets of job-related stresses might be related with amplified CHD risk (Kuper, Marmot & Hemingway, 2002). The study wrapped up that social segregation, depression and poor societal support are major risk factors acting for development and progression of CHD and are somewhat autonomous to usual risk factors such as alcohol, hyper-cholesterol-anemia and high blood pressure with comparable potency of connection (1-2 times augmented risk of emergence of CHD with small depression and 3-5 times rise with major depressive symptoms). Social segregation/poor social support is too of a medically noteworthy enormity (2-3 times augmented risk of progressing CHD and 3-5 times amplified risk of fatality among CHD patients).

Rozanski, Blumenthal & Kaplan (1999) conducted a study to examine the influence of psychological risk factors on the pathogeneses of CVD and its
propositions for therapeutic treatments. Reviews of perspective studies provided apparent and persuasive evidences that psycho-social factors add radically to the pathogeneses and manifestations of coronary arterial diseases (CAD). These evidences are collection basically of information pertaining to CAD risks with five definite psycho-social spheres: (1) anxiety, (2) depression, (3) character traits and personality, (4) life stress, and (5) social isolation. Pathological and physiological mechanisms that underlie the association among above unites and CAD incidence was further separated into behavior mechanisms in which psycho-social situations contributing to elevated incidences of undesirable health related behavior, for example smoking, poor nutrition and alcohol consumption, and patho-physiological systems like platelets stimulation.

A wide-ranging organization of evidences from live model (particularly the cynomolgos monkey) revealed that unceasing psycho-social stresses may cause excessive activation of sympathetic nervous system, to speed up the process of atherosclerotic constriction and transitory internal dysfunctioning along with necrosis. Evidences from monkeys too indicated that psycho-social tensions consistently induce hyper-cortisolemia, malfunctioning of ovaries, and too much adrenergic activity among pre-menopausal female monkeys, and finally cause acceleration in atherosclerotic constriction build up. They, furthermore, analyzed records linking CAD to severe distress and subjective variations in responding of sympathetic nervous system.

The existence of causal atherosclerotic plaque in CAD patients, severe distress, etc. causes heart related vascular constrictions. The latest statistics indicated that the preceding experiences influenced the results. Sympathetic nervous system becomes highly responsive which is manifested in exaggerated blood pressure and heart beats as a response to psychological triggers, which is inner trait for several human beings. Recent figures linked hyper-responsivity of sympathetic nervous system to increased expansion of carotid-atherosclerotic constriction among humans and to aggravated heart and carotid-atherosclerotic constriction among monkeys.

In a similar kind of study, Kuper & Marmot (2003) investigated the alliance connecting job stress and constituents of the job stress model with coronary heart diseases (CHD) risk. It was a potential group study (Whitehall II study) carried out
among office employees in twenty civil services department located in London. 6895 men and 3413 women employees falling in age range of 35–55 years actively participated in the study. The study was based on five phases. At initial phase of the study (during 1985–1988), information was collected from each participant using self-report psycho-social work characteristics. Follow-up of the participants was organized till the completion of fifth phase (during 1997–2000), with roughly 11 years follow-up.

Evidences suggested that the persons with simultaneous poor decisions liberty and soaring demand (work stress) are highly prone to CHD. Excessive work stress and poor decisions liberty, confirmed CHD incidences. Work stress has a strong effect on CHD incidences and it was highest among young employees, however no effect of alteration was observed following communal supports at employment grades. They concluded in the study that work related stress, lofty work demand, and, in fact, poor decisions liberty was strongly related with higher risk of CHD among participants.

In an editorial, Kobayashi (2004) wrote that recurring or continuing influences of job stressors leads to a kind of tiredness labeled as “accumulated fatigue,” which may ultimately grounds ischemic heart ailment or a stroke attack. Among a variety of job stressors, elongated working hours and deficiency of sleep is one of the most important risk factors. Shift work, unbalanced working hours, frequent vocation-associated tours, irritating work environments, etc. are other potential risk factors for employees. Besides these, the persistent outcomes of emotional and mental work stress that were explained using “job demand-control-support model” are associated with CVD. According to the model, elevated work demands and small job controls escorted by poor social supports at job are mainly detrimental to physical well-being. On the other hand, the bio-medical systems linking psychological work stress to CVD remains completely explained.

Additionally, Emberson, Whincup, Morris, Wannamethee & Shaper (2005) examined the impact of “within-person variations” have on the anticipated threats relationships involving physical inactivity, smoking cigarettes and amplified body mass index (BMI) and the progression of CVD among 6452 British males of 40–59 years of age with no earlier proof of CVD were pursued for most important CVD incidents
(incurable/curable stroke or MI) and all-cause deaths for more than 20 years; trend of lifestyles were established at standard time gaps all through the investigation. CVD event within the first 20 years was observed in 1194 men (18.5%). Use of baseline assessments of cigarette smoking and physical activity in analyses resulted in underestimation of the associations between average cumulative exposure to these factors and major CVD risk. CVD events were over 4 folds increased for profound smokers as compared to non-smokers and 3 folds increased for males doing no physical activities as compared to those males who take moderate part in physical activities. Key CVD threat was enlarged by six percent for every 1 kg/m2 rise in standard BMI. Taking all males who had incident of CVD, the risk levels are such as: non-smokers, moderately physically active, and with a BMI of 25 kg/m2 (nearly 6% of people), sixty-six percent of CVD episodes were postponed or prevented. Results showed little variations in results for a variety of supplementary risk factors. Results obtained for all-cause mortality were almost similar. They concluded that non-consideration of “within-person variations” can direct to under-evaluation of the significance of lifestyle associated distinctiveness in deciding CVD risk. Deterrence by changing lifestyles has a great defensive characteristic.

Moreover, Medina, Morey, Zea-Díaz, Bolanos, Corrales, Cuba (2008) studied the pervasiveness of lifestyle associated CVD risk factors among adult populations of Arequipa, a city in Peru. They considered the pervasiveness and pattern of alcohol intake, short of physical activities, smoking behavior; little fruit and vegetable intake and high-fat diet were assessed in 1878 participants (867 males and 1011 females) in the populace based research. The outcomes obtained revealed that the age-consistent pervasiveness of former smoking behavior, current smoking behavior, and non-smoking behavior were, 22 percent, 14 percent, and 64 percent, respectively. Pervasiveness of existing smoking behavior was considerably elevated among males than females. Existing alcohol behavior pervasiveness was 37.7% and significantly high among males than females. Pervasiveness of binge alcohol intake was 21.2%, and the proportion of males with binge intakes (36.1%) was considerably greater than for females (6.4%). The immense population of alcoholics accounted a prototype of alcohol intake largely on week’s end and holiday instead of habitual intake with meal on everyday basis.
Percentage of adequately non-active individuals was 57.6% and was notably high among females as compared to males. In general, 42.0% of adult population accounted consumption of fat saturated diet, 34.5% accounted for poor fruits eating, and 33.3% accounted poor vegetables consumption. Thus, elevated pervasiveness of lifestyle-associated CVD risk factors was established among Andean people. They concluded that protective interventions are immediately required to cope up with the emergent problems.

In a recent study, Schneider (2012) examined the effect of stress reduction in secondary prevention of cardiovascular diseases. Randomized controlled design was used for examination for a sample consisting 201 males and females with adverse cardiac conditions. The leading outcome was the combination of myocardial infarction, stroke or all-cause mortality. Less important outcomes consisted of revascularizations, cardiovascular deaths and cardiovascular hospitalization; blood pressures; and lifestyle associated behaviors and psychosocial stress factors. During follow-up of 5.4 years, a 48% reduction in the leading outcomes in treatment group was revealed. Moreover, 24% decline in less important outcomes among treatment group were found. Around 4.9 mm Hg reductions were noticed in systolic blood pressure and anger expression. They concluded that the selected treatment program and mind-body intervention, significantly contributed in reduced mortality risk, stroke, and myocardial infarction in cardiac patients. Such changes had significant association with psychosocial stressors and lower blood pressure. Thus, in secondary prevention of heart diseases adoption of such practice may be clinically helpful.

Further, Nabi, Kivimaki, Batty, Shipley, Britton, Brunner, Vahtera, Lemogne, Elbaz, & Manoux (2013) inspected if persons who detailed that stress negatively influence their physical healthiness are at an augmented risk of developing CHD than those who reported for no health damaging effects of stress on them. Analysis was founded on 7268 males and females (with average age of 49.5 year; inter quartile range was 11 year) included from British Whitehall II Group investigation. Follow-up of more than 18 years noticed 352 cardiac deaths and only one non-critical incident of myocardial infarction. Following alteration for socio demographic attributes, at baseline those participants reported that their health is affected by stress awfully bear 2.12 times
elevated risk of cardiac deaths or events non-critical MI judged against those reporting no health deteriorating effects of stress. The relationship was satisfactory but continued to be statistically important following regulation of behavioral, genetic and other emotional risk factors counting measures of stress level of social support and perceived completely attuned risk ratio: 1.49. In present cohort study, it was established that the perception about stress effects on health are varied from perceived levels of stress, and are linked with raised risk of CHD. They emphasized that randomized controlled examinations are required to establish whether ailment risk can be lessened by rising medical awareness of those complaining for health damaging effects of stress.

However, Gabor & Francis (2014) concluded in his review paper that regardless of the massive growth in the area of free radical vascular physiology and cardiovascular medication, lots of aspects remained unexplored. For instance, we need to understand the so called regulatory mechanism which is responsible for activation of oxidation process in the heart and vessels wall for the specific down-stream objectives and functions. With expansion of novel trans-genic and unconscious animals, molecular tools and medicinal agents, researches become more precise and comparatively easy in the field of cardiology. Manuscripts published on these mechanisms have added to an enhanced comprehending of the functions and regulations of free radicals in CVD.

The reviewed literature suggested that stress is detrimental in progression of CVD as well as contribute towards worsening the symptoms. Unhealthy lifestyle is another main risk factor in CVD.

E. Emotional Intelligence and CVD

Emotional intelligence is a capability to relate information about emotions to routine life experiences (Salovey & Pizzare, 2001). Management of emotions is only one aspect of emotional intelligence. The foremost investigators in this area, Salovey and Pizarro (2001), suggested that emotional intelligence too incorporates one’s capability to identify emotions, ability to utilize emotions, to improve cognitive processing and understanding of emotions. They argued that these abilities are not same as IQ but are equally essential for success in workplace, in social interactions and intimate personal
relationships. Those are good at emotional intelligence frequently come out as leaders. The foundation of emotional intelligence is said to be self-knowledge, which involves awareness of one’s own emotions, ability to regulate these emotions and self-motivation. Being aware of one’s own emotions is at the very heart of emotional intelligence. Individuals, proficient enough to examine their emotions as they happen are poorly ruled by them and accordingly more competent to deal with their emotions. Moreover, emotions may be regulated by participating in behaviors that are joyful, alleviate upsets or support during restless times. Following studies examined the role of emotional intelligence in CVD:

A large sample study by Rosalind (2001) examined the association of emotional intelligence and health. Recent studies indicated that emotions like stress, anger, rage, etc. are important risk factors that have serious as well as significant implications for overall health of a person. He emphasized that by providing training of emotion regulation the incidences of chronic diseases can be prevented. He selected hundred patients suffering from chronic diseases and hundred healthy individuals randomly form local hospitals and general population respectively. Assessment of emotions was done using emotional intelligence scale. Statistical analysis of the obtained scores revealed that unrelieved ailments for instance asthma, cancer, kidney ailments and coronary heart diseases are strongly associated with poor emotional intelligence.

Later on, Gross (2002) developed process model for regulation of emotions which suggested that the strategies that act during emotion generation are different from the expressive phase. The review focused on two strategies utilized generally for downregulating emotions. One being reappraisal, appears early during emotion-generative phase which focused on modifying the way of situation construction in order to reduce the emotional impact of actual situation. The next strategy, suppression, appears in later phase of emotion-generative process. It emphasizes on the inhibition of expression of emotions. Experimental studies of individual-differences suggested that reappraisal is highly effective than suppression. The study suggested that the reappraisal reduce emotional experience as well as behavioral expression leaving no adverse impact on the memory whereas suppression reduces behavioral expression
directly without reducing emotional experience leading to impaired memory. In fact, suppression also bought increment in physiological response for suppressors. Review emphasized on necessary aspects of regulation of emotional processes.

In an empirical research, Donaldson-Feilder & Frank (2004) compared emotional acknowledgment and emotional intelligence (EI) as predictors of physical welfare, mental wellbeing, and work contentment. Comparison was based on the effects of job control. Results of 290 workers revealed non-significant predictability of EI for all three health products, after reporting for job control and acceptance. Recognition envisaged physical well-being and mental health except work contentment, while work control was linked only with prediction of work contentment. They concluded that acceptance of one’s emotions may result in increased mental well-being.

Moreover, Evrydiki (2010) investigated for association between coronary heart diseases (CHD) and emotional intelligence in a total sample of 100 subjects divided into two groups: one is of 50 patients of CHD labeled as CHD group and another is control group of 50 non-CHD healthy persons. They used 2 self report inventories to evaluate various elements of characteristic emotional intelligence for example emotional regulation, perception of emotions, use of emotions and emotion expression. The analysis of the results revealed that poor emotional intelligence is associated with CHD. Results suggested that poor emotional regulation, inability to use appropriate emotions and high level of negative expressiveness are significantly related to incidence of CHD. Moreover, they elaborated on application and role of trait emotional intelligence in clinical field.

In addition to previous studies, Chrisanthy & Katerina (2013) examined the association connecting various elements of Emotional Intelligence to incidences of CHD. Overall 300 patients were observed throughout 3 years long follow-up which was an effort to reproduce and spread out an earlier research carried out among CHD patients of Greece. Assessment on several dimensions of emotional intelligence was based on scores of a self report inventory of Emotional Intelligence. End results demonstrated a significant association between incidences of CHD and EI. Investigation claimed that EI play significant role in developing CHD.
In an effort to validate the results of previous studies, Roxana, Ismi, Maria, Abdullah & Soh (2014) investigated role of emotional intelligence as an underlying mechanism in adherence to low physical activities among adolescents in secondary schools of Malaysia. Total 270 students of 16 years of age participated in the study. Results revealed that school athletes showed higher composite subscale and total EI scores which supported the claim that a positive association exists between EI and increased physical activity. Thus, one with sedentary lifestyle may have poor emotional intelligence.

Recently, Dimitrios & Chrisanthy (2014) examined the relationship between understanding of emotions in context of emotional intelligence and diseases of cardiovascular system, namely diabetes mellitus, cardiac problems and obesity. The present investigation was accomplished on 300 participants for a period of 3 years. Scores of all participants are obtained on completed self report inventory which assessed different aspects of EI, such as other’s emotional evaluation, self emotional evaluation, utilizing emotions and management of emotions. Results of the study extended and strengthened the findings of earlier studies, which revealed strong relationship of cardiovascular diseases with psychological characteristics, such as anger, anxiety and other aspects of EI. Moreover, the study filled the gap in the relevant literature, as a novel attempt to investigate correlation between the two variables under study. Furthermore, study focused on the importance of improving and cultivating EI among patients, so as to eliminate adverse effects related diseases.

Most of the studies supported a well-built connection linking poor emotional intelligence skills to incidences of adverse cardiac conditions. Studies suggested that emotional intelligence skills are crucial to handle emotional stress effectively.

F. Optimism/ Life orientation and CVD

Positive states of psyche have extensively been connected with physical wellbeing and efficient coping whereas despair, dejection and depression have been related to submission, diseases and even deaths (Seligman & Martin 1975). On one side
optimistic approach in life acts as a shield against progression of psychological risk factors and on the other side such an approach manifests rapid recovery from a chronic disease. Several studies quoted below, illustrate this in more empirical terms:

**Scheier, Matthews, Owens, Magovern, Lefebvre, Abbott and Carver (1989)** examined the consequences of inherent optimism among 51 males of middle age undergone bypass surgery for coronary arteries. Inherent optimism was found to be connected with more rapid revitalization rate throughout hospitalization, over and above faster adaptation to normal life following discharge. Finally, after 6-month follow-up, a tough relationship was seen amid higher level of optimism and life satisfaction. They concluded that optimistic approach in life and positive emotions might too prove defensive for supplementary bodily weaknesses. Likewise, Leedham, Meyerowitz, Muirhead and Frist (1995), in a study based on interview of 31 patients with heart-transplant surgeries both prior and following surgical treatments, concluded that those assessed with greater level of optimism and positive life orientation before the surgery showed more clinging to therapeutic treatment following surgical treatment, over and above, got improved condition statement throughout six months follow-up after operation.

In a longitudinal study, **Shepperd, Maroto, & Pbert (1996)** examined whether successful adoption of health behavior related to reduced risk of CHD is predicted by optimism (measured by the Life Orientation Test). They conducted an eighteen weeks long cardiac rehabilitation program. Total 22 patients participated in the rehabilitation program. Participants were given goals manifested in reducing risk of adverse cardiac event. They measured optimism at the beginning of the program and found that those patients were assessed with higher level of optimism showed more success in lowering body fats and global coronary risk level. Also, they demonstrated increased aerobic capability by the closing stages of the program. Furthermore, the effects were highly significant even after controlling the extent of the goal, negative affect, and health changes.

Similarly, **Tindle, Davis & Kuller (2010)** presented an extensive, multidisciplinary study plan based on diverse methods and incorporated doctrine of
genetics, epidemiology, behavioral medicine, and psychophysiology to address several research questions on how attitudes and CVD are related to each other. In a large sample study they focused on attitudes and CVD, but had wider suggestions for comprehending relation of psychological factors to unrelieved diseases of later life. They said that attitudes may have an effect on CVD risks in numerous manners, by altering a person’s healthiness behavior; increase of conventional CVD risk factors; stress responding effecting in physiology of disease process and may affect adherence to intervention. They concluded that more optimistic and less hostile attitudes may considerably reduce CVD risk. They had not studied environmental and genetic determinants of attitudes.

As quoted earlier as well that Diener & Chan (2011) reviewed seven types of evidences revealing high subjective wellbeing (e.g. Life satisfaction, sanguinity, and optimism) and which promotes wellbeing and long life. Eventual long-term investigations of healthy persons proved that different kinds of subjective wellbeing like healthy emotions help to forecast wellbeing and prolonged existence with a control of physical states and socioeconomic conditions at baseline. However, accumulated evidences claimed that individual wellbeing stretches the lives of patients with assured disorders like cancer, stays dubious. On the other hand, extremely stimulated or agitated positive emotions might be unfavorable to healthiness. Several problems like etiology, effect size, statistical controls and kinds of individual well-being, are argued. Cardiovascular literature attempts to make a distinction for the harmful effect of resentment against depression, against apprehensions and evidences supported that both resentment/aggression and depression, in addition to relentless hopelessness, are disadvantageous to cardiac healthiness.

Another cross-cultural study by Hernandez, Kershaw, Siddique, Boehm, Kubzansky, Diez-Roux, Ning, Lloyd-Jones (2015) investigated the relationship amid optimism level and cardiovascular health (CVH). It was a Multi-Ethnic Study of Atherosclerosis including 5,134 adult participants aged 52-84 years. Data collection was carried out during first follow-up in 2002-2004. Regression analysis was done to scan relationships of optimism with CVH, following control of several socio-demographic
factors. They compared CVH metrics of physical activity, diet, smoking, blood sugar, body mass index and overall cholesterol levels. End products of the study revealed that the participants lying in the uppermost quartile of optimism had moderate to perfect CVH in comparison to slightly optimistic group. The study supported a cross-sectional connection amid optimism and CVH.

The studies revealed a close association between positive life orientation or optimism and lower risk of cardiovascular health problems. Numerous studies suggest significant relationship between optimism and successful coping with chronic diseases.

2. Psychological Intervention and CVD

Emotional sufferings among patients of cardiovascular diseases (CVD) have been linked with a reduced probability of recovery. Thus, clinicians have to include evaluation of moods and to pass on CVD patients assessed with psychological suffering for supplementary treatments. Psycho-social interventional programs might reduce risk factors’ report among cardiac patients. The effect of the psychological rehabilitation on cardiac events and psychological distress has not been documented in an impressive manner; on the other hand, Cardiac rehabilitations aim at encouraging most favorable psychological and physiological working. But still, preliminary need is to expand research areas so as to examine the corresponding psychological effect. A number of studies point towards the fact that adherence to cardiac rehabilitation after myocardial infarction (MI) could possibly lessen death rate by 20- 25 percent. Elaborated researches have aided the development of a psycho-biological model for comprehending cardiovascular diseases. Present review is aimed at gathering preliminary knowledge and the practicability of different psychological intervention programs for patients with CVD.

Bennett & Carroll (1994) reviewed evidences relating to the usefulness of cognitive-behavioral intervention, generally described, in cardiac rehabilitations. Most important concern lies with decline in risk and with the improvements in psychological suffering subseuent to myocardial infarction. The accessible information allows only some ideal endings. The existing records, imply that programs aimed at lessening Type A behavior, quitting smoking behavior , rising work outs, or that teaches stress regulation skills, might be successful in dropping psychological sufferings and improving coping
skills, while in small period, pointing at long lasting advantages of such programs is difficult. Besides, emotional rehabilitations of such kind would appear to be related with constructive behavioral changes. On the other hand, small evidences support the fact that these alterations prove beneficial in declining CHD morbidity or mortality. However, the cynicism of the results might reveal limitations in research plan and the failure to optimally match patients to programs rather than an intrinsic lack of efficacy of the intervention.

Further, **Taylor, Miller, Smith, & DeBusk (1997)** found in an investigation based on a total 435 post myocardial infarction patients that an attention-based psychosocial treatment declined cardiac death rate in a year, and the frequency of repeated myocardial infarctions was drastically reduced in 7-years follow-ups. On the other hand, two examinations of multi-model intervention which were subsequently large and randomized were delivered by health visitors. These trials proved unsuccessful in improving depression level among patients or cardiac consequences. In the Montreal Heart Attack Readjustment Trial (M-HART), an encouraging and instructive nursing intervention was offered to the highly distressed post MI patients. This relatively, restricted intervention was judged against the standard treatment. Following a years’ record, the treatment demonstrated no effect either on cardiac deaths or emotional distress, whereas it was in reality linked with an elevated death rates among females. On the other hand, sub-groups analyses showed that patients whose emotional distress did improved with intervention, also revealed favorable long-lasting cardiac effects.

In addition to previous researches, **Dusseldorp, Elderen, Maes, Meulman & Kraaaij (1999)** estimated the supplementary effect of psycho-social treatments or rehabilitations from articles on coronary diseases by meta- analyses of twenty three randomized controlled trails. Relaxation training, group social support and stress management were the highly dominant features of psycho-social interventions. Depression, nervousness, mortality, organic risk factors, and persistent cardiac incidents were the end-points that were clinically considered. A total of 2,024 patients were participants in the study which were further divided into treatment groups and control group. Those provided with psychosocial intervention showed high declines in systolic
blood pressure level, emotional distress and blood cholesterol levels than control group. Patients who lacked psycho-social interventions had 70% higher deaths rate and 84% elevated cardiac recurring events rate throughout 2 years follow-up. Higher level of anxiety, aggression, and depression in post MI patients were highly reduced by cardiac rehabilitation. Meta-analysis of psychoeducational program (included health awareness and stress regulation components) of cardiac patients concluded that such programs contribute for significant improvements in cholesterol level, body weight, blood pressure, smoking behavior, physical exercises and eating habits. They also contributed in reducing mortality and MI cases to about 34% and 29% respectively. Contrary to this, these programs showed no improvements in mood and anxiety level.

Moreover, Rodgers & Fayter (2005) identified a total of 35 systematic reviews among 5,735 references that they believed appropriate for insertion in their study. Out of 35 integrated orderly analyses of the consequences of psycho-social treatments, 22 linked to cancer disease, 10 to cardiac diseases, and 3 integrated key researches of both clusters of patients. Among 10 cardiac diseases reviews, 2 subsisted as protocol during report construction. The 35 assessments enclosed a very wide variety of psycho-social treatments, counting therapies like individual therapy, family therapy, group therapy, counseling, education, stress management, cognitive-behavioral therapy, meditation training, relaxation, coping skills training, biofeedback, social skills training, problem solving training, desensitization, rehearsal modeling and emergency management. The procedural superiority of these assessments was normally fairly small; with only 29% of the reviews passing over four out of seven quality criterions. On the whole, the consequences of the incorporated studies showed several useful effects of psycho-social interventions on extensive behavioral results for patients with cancer and heart diseases. Regarding substantial results the evidences remained uncertain in cancer patients; however, appeared to be more hopeful for cardiac diseases.

Later on, Whalley, Rees & Davies, Bennett, Ebrahim, Liu, West, Moxham, Thompson & Taylor (2011) determined the autonomous consequences of emotional treatments among CHD patients and looked for investigation-level analysts for influence of the treatments. Randomized controlled assessments of emotional treatments
judged against standard care, given by qualified clinicians were incorporated in their study. Merely investigations calculating the autonomous effects of the behavioral factor with at least follow-up of six months were studied. No strong evidence revealed that behavioral interventions declined the risk of revascularization or non-serious infarction and total deaths. Among smaller collection of investigations stating cardiac death rate, a reasonable encouraging influence of behavioral interventions was noticed.

Moreover, psychological interventions resulted in moderate reduction in depression level, standardized mean difference (SMD) 0.21 and anxiety, SMD 0.25. Outcomes for death rate showed support for small-research biasness, but no partiality was supported in end results for additional factors. Meta-analysis of the records discovered that there are 4 important forecasters of interventional outcomes on depression levels: (a) a goal to cure type-A behaviors was additional efficient than other treatments. On the contrary, treatments that (b) target to spread awareness among patients for cardiac risk factors, (c) incorporated client-led arguments and affective hold up as chief remedial element, or (d) incorporated relatives in the interventional processes were considerably low at success.

In a similar study, Kristina (2012) tested the practicability of a cognitive technique that was freshly established to extend lives of females. Situations with gender isolated groupings were demonstrated. The doctrines of a psychological awareness program initially planned to soothe the tensions of patients with CVD risk behavior was utilized as foundation of interventional program. The intervention was designed according to the male and female environmental stressors. The actual stress lessening program was same for both men and women; it only differed at elements of discussion and responses of patients to the program which were regularly monitored in all the 15 sittings. 30 successive patients, 11 females and 19 males, who were admitted in hospital for severe coronary disease, were the participants of the intervention program. Every participant was highly motivated and articulated their want to become skilled at coping strategies to handle stress in routine life. Total 5 groups: 3 men groups and 2 women groups were formed. Before as well as after program completion, psychological assessments were taken. Results revealed no gender disparities in the initially designed
programs, however, conversation ways adopted were different for men and women. Women were found to be more open as well as more personal when compared to men. Frequency of family issues was higher than issues regarding job, although each woman participant of the study doing some job outside. Men talked more about realistic things, frequently regarding their occupations, and least about what they feel. Results of the intervention program ruled significant decline in daily stresses of life for both, but decline was more in women than men. No change was noticed in depressive thoughts over time, they stayed low at baseline. However, anxiety level which was elevated at baseline, reduced drastically, however more so case of females than for males. Kristina concluded that females may gain from female’s group while male prefer to find females in their group. Compared to males, females are more adjusted to gender segregated groups.

3. Psychological interventions and CVD in Indian researches.

Although, numerous studies were carried out investigating the benefits of psychological interventions for cardiovascular patients, but majority of the researches were carried out in western population. Limited studies are available in the context of psychological interventions given to CVD patients in India. Some of these are quoted here:

Chavatapalli (1988) conducted a study to investigate the efficacy of cognitive behavioral intervention on emotional distress, health complaints and life quality of myocardial infarction (MI) patients. Sample consisted of total 40 MI patients: 20 in control group and 20 in experimental group. Both the groups were under conventional cardiac care. In addition the experimental group underwent cognitive behavioral intervention program which was based on coronary counseling, relaxation, cognitive strategies of positive imagery, coping self statements, cognitive restructuring and behavioral counseling to significant others. The subjects in the experimental group improved significantly on outcome measures than the controls group at post evaluation. Significant reduction in emotional distress, health complaints, general arousal level, frequency of chest pain episodes per week and increase in positive affect and quality of life were found. The improvement was maintained over a period of 3 month.
Improvement on various measures in the control subjects were observed as a result of intervention provided to them after control period of two months. Investigation advocated positive results of interventional programs.

India is advocating a hastened epidemiological change with a consequential rise in the weight of CVD risk factors. In adult populations (above 20 year of age), the approximate pervasiveness of CVD is about three to four percent in rural regions and eight to ten percent among urban regions, which depicts a 2-times increase in rural cases and 6-times increase in urban cases from the period between 1960 and 2000. Researches among Indian migrants in different areas of the globe have accepted an increased receptiveness to CHD in contrast to the indigenous population based studies. The evidence for social patterning of CVD has been well established. Gupta, Gupta & Ahluwalia (1994) reported a higher prevalence of CHD among uneducated and less educated Indians in rural Rajasthan and among those with poorer housing across both sexes (N=3148). The study highlighted that having more children and crowded housing was associated risk factors. Other studies have similarly implicated education as a risk factor for CVD. A hospital-based case–control study conducted across eight hospitals in Delhi and Bangalore (N=350 cases, 700 controls) revealed that the relative risk for ischemic heart disease is significantly higher among the urban educated adult population than those with no education (Rastogi, Reddy, Vaz, Spiegelman, Prabhakaran & Willet, 2004).

In addition to earlier studies, Prabhakaran, Jeemon, Goenka, Lakshmy, Thankappan, Ahmed, Joshi, Mohan, Meera & Das (2009) conducted a study to evaluate the influence of a worksite treatment program on CVD risk factors. The investigation drawn in assortment of facts associated to the person attributes related with key CVD risks, demographic and clinical profile, past medical history and bio-chemical structures. Inflexible quality control measure ensured high precision, contrasted blood pressures, completeness and biochemical measurements across the 10 study locations. The interventional program initiated in 2003 and completed up to initiation of 2007. The baseline survey, an added sovereign sub-sample of the people was reexamined once more during period 2006 to 2007. All 6 locations recruited 1,000 persons in groups by gender.
and age. But 5,899 persons only agreed to take part in the recurring survey, which yielded 98.3% response rate. At control sites, randomly selected 1,000 persons participated in the replicate investigation with 90.7% response rate (N = 907). A multilevel, multi component, and varied method treatment was given by nearby residing and trained health professionals in participant organizations as a setting, agent, target and a resource, for more than 4 uninterrupted years. It was populace-based approach of treatment enlarged by high-risk and ecological approaches. Originally, the common uniqueness of the 2 population was compared using t test and chi-square test for comparing means and proportions. Aggregate fractional changes in risk factors at the 95% confidence interval (CI) of changes in the two groups: interventional group and controls group were compared independently.

Separate analyses were done for participants who attended baseline as well as final surveys. Mean differences in CVD risk factors in both groups were compared with the help of mixed linear regression model. Every dependent variable was corrected for gender, age, baseline educational qualifications, baseline mean and body mass index of similar variables. The results suggested that a detailed CVD prevention program comprising effectively formulated health intervention program is successful in decreasing the CVD risk factors considerably. Interventional survey researches along with group analyses highlighted major decline in CVD risk factors in interventional group as compared to control group. Significant relative decline in waist circumference, mean body weight, blood pressure, plasma glucose levels and serum cholesterol in the intervention group contrasted with control group’s significant increase in risk factors. The facts suggested that a work-site approach in health endorsement courses on CVD risk factors can be put to operation and can have a health promoting effect on intermediary CVD results among developing nations.

Moreover, Ajay & Prabhakaran (2010) in their review article examined the Implications of the INTERHEART study that studied the role of psychological and usual risk factors in the prophecy of CHD risk in Indian population. They agreed that the strategy determines using regulatory approach of legislation on food and agricultural industry or physical activity or tobacco that will show great effect on decline of CHD risk
factors among population. Moreover, the health departments need to emphasize on: (a) giving basic knowledge for increased understanding among people and developing surroundings suitable for adopting health enhancing habits; (b) timely recognition of risk factors among population and providing cost efficient treatments to decrease the risk; (c) to provide easy and timely detections facilities to diseased individuals and implementing cost efficient preventive actions to control problems. Evidences from INTERHEART provide strong base to develop interventional guidelines and algorithms of CHD treatment at different levels health concern. They concluded that the INTERHEART study too opened up some unreciprocated queries on the patho-biology of the early onset of myocardial infarction in Indian population and demands for the requirement of emerging competence in scientific researches for CHD in India.

Later on, Raj & Sajimon (2010) examined the effects of the depression and anxiety on ischemic heart diseases (IHD) patients and on healthy populations. They adopted the method of purposive sampling for selecting the sample. Sample, thus, selected included 100 patients of ischemic heart disease (IHD) (n = 50) and common healthy populations (n = 50), (men and women, both) which was taken from diverse clinics of Trivandrum and Kollam districts of Kerala. State-Trait Anxiety Inventory, Beck’ Depression Inventory, General Health Scale and General Stress Index, were utilized for data collection. Results suggested for statistically significant differences among ischemic heart disease (IHD) patients and normal population for general stress, general health, depression, and state anxiety. Results revealed significant difference in general stress, general health, state anxiety, life quality, depression, and events of life among all 3 groups made on behalf of number of ischemic episodes.

Furthermore, Nehra, Sharma, Ali, Margoob, Mushtaq, Kumar & Nehra (2012) conducted a study on sample of 150 participants, comprising 50 in the study group (drawn from the outpatient clinical services) and 50 in the control group (from the general population) from Kashmir. Moreover, 50 controls from the local population of Haryana were taken in order to study alexithymia in much broader context. Psychological assessment was done utilizing Jenkins Activity Survey (JAS-C) and Toronto Alexithymia Scale (TAS-20). Statistical analysis of the data revealed a significant prevalence (40%) of
alexithymia in the study group. The comparison of alexithymia scores amid the study groups and controls group didn’t reveal any significant difference and paradoxically the prevalence in the control group was greater. Comparison of control group selected from Kashmir population and Haryana, depicted highly significant difference. Thus, suggesting that perpetual trauma and unending stress resulting from prevailing condition in Kashmir together with the presence of some kind of mental disorders in a significant segment of Kashmiri population has rendered the whole population more vulnerable to developing alexithymia.

Recently, Narayanan & Prabhakaran (2012) published a review article titled “Integrating mental health into cardiovascular disease research in India.” They did systematic search for relevant epidemiological Indian studies on psychiatric disorders and CVD on MEDLINE, PsychINFO and Google Scholar, with reports from WHO and other international agencies. They scanned the literature on adults across urban and rural settings of both sexes, incorporating qualitative, statistical and mixed method designs. The inclusion criteria consisted of clearly defined parameters of MH, including psychiatric disorders, psychosocial stress, personality disorders, quality of life, well-being and family variables in connection with CVDs and their risk factors. They concluded that data from mental health research is sufficiently compelling to highlight the role of socioeconomic status, chronic stress and psychological disorders such as substance abuse, depression, social support in relation to increased vulnerability to cardiac diseases. They elaborated on psychosocial consequences of cardiovascular diseases which include deficits in the domain of coping skills, life skills and neurocognition, with burden on part of care-provider. Implications of bio-psychosocial models and interventions which target contextual and complex individual variables at the same time on outcomes of cardiovascular treatment have revealed the importance of examining mental health in Indian context. Integration of mental health processes into mainstream research is the most urgent need of the hour. Multidimensional approach is needed at all levels, whether it is individual level or community level, to realize these goals.
In an empirical study, Parswani, Sharma & Iyengar (2013) examined the consequence of the Mindfulness Based Stress Reduction (MBSR) intervention on warning signs of depression, body mass index (BMI) anxiety, perceived stress and BP among CHD patients. Program was conducted at an out-patient department. Treatment-as-usual group (TAU); and parallel groups - MBSR group - randomized control design with a baseline, post-intervention follow-up evaluations were taken up. 30 men CHD patients with 30-65 ages were randomly assigned to the groups. Intervention program comprised 8 weeks’ sessions of planned MBSR therapy for the MBSR group and single health educational sitting for the TAU group patients. Standard clinical interventions and consultation of cardiologist were recommended to each group. Major result of the investigation were based on comparisons based on scores obtained on: Perceived Stress Scale, Hospital Anxiety and Depression Scale, BMI and BP. End results showed statistically significant decline in symptoms of perceived stress, BP, anxiety, depression and BMI in patients of the MBSR group. During 3-months follow-ups, interventional benefits were sustained in MBSR patients group. They concluded that MBSR intervention was successful in dropping warning signs of perceived stress, BP, anxiety, depression, and BMI in CHD patients.

In another similar kind of study, Roshan (2014) examined the level of psychological distress of female cardiovascular and cancer patients in a comparative study on a total sample of 225 women from Kerala, which consisted of 75 cardiovascular (CVD) patients, 75 cancer patients and 75 normal persons. Patients were selected from the various hospitals across Kerala using purposive sampling technique. CVD patients, cancer patients and normal group showed significant differences in their level of psychological distresses. The upshots revealed that CVD patients possessed statistically significant higher levels of psychological distress, anxiety and depression when compared to cancer patients and normal group. Cancer patients possessed statistically significant high stress levels than CVD patients. Normal group too had notably higher stress levels than both the patient groups.

Thus, the review of literature revealed strong associations between psychological risk factors and incidence of CVD. This cause and effect relationship is
crucial part of a number of studies carried out in the Health sphere and Clinical Psychology. As far as the formulation and effectiveness of psychological intervention in CVD is concerned, different studies have highlighted the positive results. Although, the available literature based on psychological intervention in Indian context is limited and whatever studies are available are conducted on small sample size.

The chapter has summarized with possible review of literature on the variables under study. The review of literature is based on journals, resource books, review articles, empirical research work and writings of the scholars. Review is indicative of some gaps in understanding of psychological frame of CVD. The specific objectives and hypothesis framed in light of historical resume are listed in next chapter.