The 20th century revolution in health and the consequent demographic transition has led to major change in the pattern of the disease. As the life expectancy has improved, non communicable diseases (NCDS) are beginning to predominate. Globally deaths from NCDS are expected to climb to 49.7 million in 2020, an increase of 77% in absolute numbers and an increase in their share of the total deaths from 55% in 1990 to 73% in 2020. In India, death from NCDS are projected to almost double, from almost 4 million in 1990 to about 8 million a year by the 2020, while death due to communicable, maternal, perinatal conditions and nutritional deficiencies are expected to fall from almost 5 million to below 3 million a year. A major part of this change in the disease profiles can be attributed to a shift in a lifestyle and the behavior of the population. These changes include tobacco use, physical inactivity, alcohol consumption and changing pattern of diet. In the developing countries like India CVD, cancers and diabetes are major contributors to the burden of NCDS (Reddy and Yusuf., 1998).

Over 80 per cent of deaths and 85 per cent of disability from cardiovascular disease (CVD) occur in low- and middle-income countries (Reddy., 2004; Yusuf et al., 2001). The Indian subcontinent including India, Pakistan, Bangladesh, Sri Lanka, and Nepal is home to 20 per cent of the world’s population and may be one of the regions with the highest burden of CVD in the world. The studies have documented that immigrants from the Indian subcontinent (South Asians) living in Western countries have a higher burden of cardiovascular disease than other ethnicities (Anand et al., 2000; McKeigue et al., 1989; Enas et al., 1992). In 2003, the prevalence of CHD in India was estimated to be 3-4 per cent in rural areas (two-fold higher compared with 40 yr ago), and 8-10 per cent in urban areas (six-fold higher compared with 40 yr ago), with a total of 29.8 million affected (14.1 million in urban areas, and 15.7
million in rural areas) according to population-based cross-sectional surveys (Gupta, 2004; Gupta, 2005). This estimate is comparable to the figure of 31.8 million affected, derived from extrapolations of the Global Burden of Diseases study (Gupta, 2004; Gupta, 2005). However, these numbers are still likely underestimates as they do not account for those with silent myocardial infarction or otherwise asymptomatic CHD. In 1990, there were an estimated 1.17 million deaths from CHD in India, and the number is expected to almost double to 2.03 million by 2010 (Ghaffar et al., 2004). In addition to the high rate of CHD mortality in the Indian subcontinent, CHD manifests almost 10 yr earlier on average in this region compared with the rest of the world (Gupta, 2005; Yusuf et al., 2004) resulting in a substantial number of CHD deaths occurring in the working age group. In Western countries where CVD is considered a disease of the aged, 23 per cent of CVD deaths occur below the age of 70; this compares with 52 per cent of CVD deaths occurring among people under 70 yr of age in India (Gupta, 2005; Ghaffar et al., 2004). As a result, the Indian subcontinent suffers from a tremendous loss of productive working years due to CVD deaths: an estimated 9.2 million productive years of life were lost in India in 2000, with an expected increase to 17.9 million years in 2030 (almost ten times the projected loss of productive life in the United States) (Goyal et al., 2006). The other indirect cost in terms of orphan hood, widowhood and other changes in household consumption pattern are equally important. The huge burden of CVD in the Indian subcontinent is the consequence of the large population and the high prevalence of CVD risk factors. These include dyslipidemia, smoking (number of cigarettes smoked per day), hypertension, diabetes mellitus, abdominal obesity, psychosocial stress. These account for 90 per cent of the population attributable risk for myocardial infarction in the world (and as high as 94% in women) (Yusuf et al., 2004). The
impact of these risk factors in different populations around the world was equally robust and similar, including in Indian subcontinent. This suggests that these risk factors account for the majority of cardiovascular diseases in India, as well as globally. Among the above risk factors dyslipidemia is the most important since it is directly responsible for CVD. Other factors either increase or decrease dyslipidemia.

It is assessed by Lipid profiling of individuals or the measurement of Total Cholesterol (TC), HDL Cholesterol (HDL-C), Triglycerides(TG), VLDL Cholesterol (VLDL-C), LDL Cholesterol(LDL-C), Total Cholesterol/HDL Cholesterol ratio and LDL Cholesterol/HDL Cholesterol ratio.

The relation between TC and LDL-C and incidence of CAD and peripheral vascular disease is well reported (Bergstrand et al., 1994). An elevation of TC in plasma is considered to be prime risk factor for CHD. The Framingham study has demonstrated the linear increase in coronary “risk” with the increment of TC from 180mg% upwards. On average each 1% reduction in cholesterol (2 to 3mg/dl) results in approximately 2% reduction in CHD incidence (Lipid research clinics program: 1984).

LDL is the carrier of 70% of total cholesterol and it transports cholesterol to tissues and thus most potent atherogenic agent. In familial hyperlipidaemias, especially when concentrations of LDL-cholesterol are elevated to a pronounced degree, the incidence of atherosclerotic complications is extremely high. Studies reported that myocardial patients with positive family history of CAD has significantly high LDL values as compared to those with negative family history (Sharma et al., 2004).

Elevated level of plasma Triglycerides has long been associated with risk of CHD (Austin.,1991; Hodkanson and Austin., 1996). A Low blood Triglyceride level is
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suggestive of efficient intravascular lipolysis. Hypertriglyceridemia indicates less effective lipolysis and increased risk (Chatterjee and Shindde., 2005).

HDL- C has an inverse relation to the risk of CHD. A hypothetical 1mg/dl increment in HDL –C is associated with 2.3% decrement of CHD risk (Gordon et al., 1989).

It has been shown that HDL/total cholesterol ratio is one of the most powerful predictors of risk of developing CAD (Singhal., 1997). The dyslipidemia is defined as ratio of Total Cholesterol/HDL Cholesterol ratio greater than 4.5.

Many times lipid and lipoprotein cholesterol levels have failed to explain the increased prevalence of CAD in normilipidemic patients. (Hughes et al., 1990).

Recently Apolipoprotein A1(apo A1) and Apolipoprotein B(apo B) have been proposed as relatively better markers for assessing the risk of CAD and its treatment regimen.Apo A1 is the constituent of HDL and apo B is of LDL. It was shown in the AMORIS study that apo A 1 and apo B might be of greatest value in predicting the risk of myocardial infarction especially in the patients having low or normal LDL Cholesterol level (Waildius et al.,2001).

Traditional risk factors like smoking, hyper-tension, diabetes are reported to account for only 50% of prevalence and severity of the disease (Gupta and Johnamm., 1997). This led to studies on newer risk factors like fibrinogen, Lipoprotein (a) (Lp[a]), homocysteine, tissue plasminogen activator etc.

Lp[a] excess increases the risk of premature CHD 3 to 100 fold depending on the absence or presence of concomitant risk factors (Hopkins et al.,1997).

A lipid tetrad index has been proposed to quantitate the total burden of dyslipidemia in a population. However, it is proposed that a simpler lipid triad index can also give us an idea about the extent of dyslipidemia. In a recent studies, it has been found that this index in a control group is much lower when compared with angiographically
assessed CAD patients whether the Lp(a) is taken into account or not (Goswami and Bandyopadhyay ., 2003).

The concentration of blood lipid in an individual or population is modulated overwhelmingly by factors such as social, behavioural, physiological and genetics. It is estimated that over 60% of the variability in serum lipids is genetically determined and most of the variation being due to polygenic influences. Interaction between the later and environmental factors is probably the commonest cause of hyperlipidemia in the general population. (Thompson, 1990).

The need for accurate determination of lipoprotein phenotypes resulted from the recognition that hyperlipoproteinemia is symptomatic of a group of disorders dissimilar in clinical features, prognosis and responsiveness to treatment. Since treatments of the disorders vary with the different phenotypes, it is absolutely necessary that the correct phenotype is established before therapy begun (Levy and Fredrickson., 1968).

There is vast variety of difference in the living style of rural, urban and suburban population. Rural population is mostly engaged in physical work and urban population in sedentary work. Suburban population may be considered as transition phase between rural and urban population. Urbanization is important risk factor for CVD. It is currently at 30% with a projected rise to 43% in 2021 (Reddy et al., 2005). Urbanization is characterized by a marked increase in the intake of energy-dense foods, a decrease in physical activity and a heightened level of psychosocial stress, all of which promote the development of dysglycaemia, hypertension, and dyslipidaemia. (Yusuf et al., 2001). Lifestyle along with geographical conditions, age and sex effect plasma lipid values of the population (Gandhi .,1982). The plasma lipid values of different population from different region reported to have separate cut
off values for separate population. In light of guidelines suggested by National Cholesterol Education Program (NCEP) it is necessary to establish normal reference intervals for plasma lipids in Indians (National Cholesterol Education Program:1994), but we still depend upon western standards to diagnosis hyperlipidaemia in clinical manifestation of atherosclerosis. In spite of Indians greater genetic and cultural diversity only few populations are covered until now and data on lipid variation is very scanty.

Plasma concentration of lipoprotein Lp(a) is considered to be a major and independent risk factor for cerebro- and cardiovascular atherothrombosis. The mechanism by which Lp(a) may favour this pathological state may be related to its particular structure, a plasminogen-like glycoprotein, apo(a), that is disulfide linked to the apo B100 of an atherogenic LDL-like particle. High concentrations of Lp(a) in plasma may therefore, represent a potential source of antifibrinolytic activity (Cano et al., 2001).

Lp[a] studies are complicated by the structural heterogeneity that characterizes this lipoprotein. In addition to isoform size heterogeneity, it has been reported that plasma Lp[a] is heterogeneous with respect to its ability to bind to lysine-Sepharose (Armstrong et al.,1990; Leerink et al., 1992). In this regard, both binding and nonbinding species have been identified, In vitro studies have suggested that compared with the Lp[a]-Lys$^+$ fraction, the Lp[a]-Lys$^-$ fraction does not inhibit plasminogen activation and does not bind to CNBr-digested fibrinogen (Leerink et al., 1992). It was speculated that proteins may interact with plasma Lp[a] in such a way as to mask the Lysine Binding Site (LBS) present in this kringle. It was reported that either fibronectin or LDL, both of which are abundant in human plasma, could function in this capacity, thus effecting the concentration of Lp[a]-Lys$^+$ fraction. (Xia
et al., 2000). In addition, Lp[a] has been shown to bind to other abundant plasma proteins including plasminogen (Sangrar., 1997). Thus variation of Lp[a]-Lys+ fraction is due to interaction of these plasma proteins.

There is no single study that has systematically evaluated trends in major cardiovascular risk factors in Uttarakhand especially in Dehradun region. No In vitro studies are conducted in Indian context to evaluate the mechanism of variation of Lp[a]-Lys+ fraction. In view of the above facts we performed multiple risk factor epidemiological studies in the rural (Manduwala, Bhavewala, Pitamberpur and Keli), suburban (Suddowala and Jhajra) and urban (Premnagar, Patel Nagar, Lakshman Chowk and LakkiBagh) location in Dehradun region, the capital of Uttarakhand to determine their lifestyle and other biochemical determinants.

The present investigation was done with the following objectives:

1. Analysis and comparison of Total lipids, Total cholesterol, HDL Cholesterol, LDL Cholesterol, VLDL Cholesterol and Phospholipids in samples collected from suburban, urban and rural areas of Dehradun and in patients with myocardial infarction.
2. Analysis of Apolipoprotein (A) and Apolipoprotein (B) in the above population.
4. Evaluation of cardiac risk and its comparison in above area.
5. Screening of Lp [a] positive patients.
6. Isolation, characterization of Lp[a].
7. Mechanism of variation of Lp[a]-Lys+/Lp[a]-Lys− fraction in individuals.