CHAPTER V
SUMMARY, CONCLUSIONS
AND FUTURE PERSPECTIVES
Cardiovascular diseases are a group of diseases affecting the heart and blood vessels. Together they are responsible for more than half of all death due to non-communicable diseases. In spite of our understanding about the mechanism of diseases initiation and progression, and the various therapies currently available, the disease burden is growing at an estimated rate of 9.2%. The Indian subcontinent is a region with world’s highest burden of cardiovascular diseases.

The Framingham heart study has identified nine risk factor for CVD which account for most of the observed cardiovascular risk. However the intensity and contribution to the outcome of the event by these risk factors varies from place to place and people to people.

One of the modifying factors is ethnicity. It is a complex variable consisting of social, biological and cultural components. An ethnic group is characterized by distinct life style and food habits. Within an ethnic group over last fifty years no change has taken place in the genetic make up. But the susceptibility to CVD has increased enormously, suggesting a role for diet, environment and lifestyle which have all undergone tremendous change.

In order to investigate the role of such life style change on the risk factors for CVD this study was taken up on a migrant population of Iranian nationals residing in Mysore and who have adapted to local environment, food and life style. This group was compared with Iranians in Iran and the Indians.

When Indians in Mysore and Iranians from Tonekabon city were compared for their lipid profile, Indians had significantly higher cholesterol and Triglycerides and significantly lower HDL-C and paraoxonase.

There was no difference in the total antioxidant activity in the serum and the reduced glutathione levels. However, serum of Indians had almost 10 fold higher 234nm absorbing substances than Iranians

PON activity of Indians showed a normal distribution whereas the Iranians showed a bimodal distribution.
The serum lipoproteins of Indians were highly susceptible to oxidation whereas the lipoproteins of Iranians was resistant to oxidation. Indians had a shorter lag phase of oxidation, they reached the maximum in shorter time and the oxidation products decomposed within the duration of the experiment. Whereas the serum of the Iranians did not reach the maximum within the duration of the experiment.

Benzoyl peroxide oxidized the HDL of Indians to a greater extent than Cu++. However, the serum lipoprotein oxidation by Cu++ and Benzoyl peroxide were not different.

The HDL had more TABRs than LDL. On oxidation the TBARs increased in LDL by a very large extent. There was no difference in the TBARs produced by Cu++ or by benzoyl peroxide.

When Iranians living in Mysore were compared with Indians or Iranians, they showed remarkable differences. Their serum lipid profile was similar to that of the Indians than Iranians. There was no difference in the total cholesterol and LDL-C. However, the total triglycerides were lower than the Indians.

The total antioxidant capacity was the same as that of the Indians. But they had higher reduced glutathione. Surprisingly the 234nm absorbing substances in their blood resembled that of the Indians and not Iranians. Their HDL-C was lower than that of Iranians but the PON activity was the same.

The serum lipoproteins, HDL and LDL of Iranians in India were more susceptible to oxidation than Indians.

Exogenously added Ascorbic acid failed to protect the lipoproteins from Cu++ or benzoyl peroxide catalysed oxidation. Vitamin E acted as a prooxideant at lower concentrations, but at higher concentrations it acted as an antioxidant.

Both ascorbic acid and vitamins E failed to prevent the inactivation of PON in the serum of Indians.
Iranians and Indians were in the similar income group, had similar trends in smoking habits, but Indians consumed more alcohol. Iranians consumed more meat products than Indians, but oil usage was similar.

Iranians had lower life stress, but had higher frequency of family history of diabetes and CVD.

Fresh fruit and dry fruit consumption by Iranians was higher than that of the Indains.

The level of exercise of Iranians and Indians was similar but Iranians in India did more vigorous exercise and underwent fitness training.

There was no difference between Iranians in Mysore and Indians on other risk factors like blood pressure BMI and W/H ratio.

**Conclusions**

Our results suggest that diet can play a major role in modifying the risk factors of CVD. Iranian population residing in Mysore would represent a genetically homogenous group living in a different environment. The environmental influences would reflect on their risk factors for CVD. Interestingly the HDL-C of the migrant Iranians decreased and the susceptibility of serum lipoproteins to oxidation increased. This is a direct reflection of the antioxidant status of their lipoproteins.

We assume that this shift is because of the dietary components, particularly the kind of oil they use. For more than five decades it was delivered that saturated fats are bad and unsaturated fats are good. Although W-3 and W-6 fatty acids are essential for normal health, the unsaturated oils can easily undergo oxidation when heated causing more harm than good when they are consumed. Interestingly Iranians in Iran use saturated oils for frying whereas Indians use unsaturated oil. The Iranians in India would also use the locally available oils resulting in a shift in their cardioprotective status, which is clearly apparent from decreased HDL-C and increased 234nm absorbing substances in their blood.
Thus what oil we use in our daily diet and not the quantity can mean health or diseases.

**Future Perspectives**

Dyslipidemia, oxidative stress, and inflammation are closely related in the development of atherosclerosis. Inflammation is a systemic body response aimed to decrease the toxicity of harmful agents and repair damaged tissue. The role of inflammation in the elevated risk factors in Indians needs to be studied.

Although HDL-C levels are inversely associated with cardiovascular risk, patients with elevated HDL-C also develop coronary artery disease and cardiac events. Hence this brings a second question into focus: is high HDL good and conversely is Low HDL bad. Two-dimensional electrophoresis has identified more than 10 HDL subspecies. Perhaps attention has to be focussed on which subtype of HDL positively correlates with risk of CVD and which subtype correlates negatively with risk.

It is evident that the unsaturated fats which are part of the lipoprotein particles can undergo oxidation leading to the complication seen in CVD. Fatty streaks are present at birth. Whether it progresses or regresses depends on diet and lifestyle. A relook at the dietary and lifestyle patterns of our own ancestors may hold the key to good health.