SUMMARY AND CONCLUSION

Cardiovascular disease is on the rise worldwide and is the prevailing non-communicable cause of death and disability in the Indian subcontinent. Women equally become victims of cardiovascular disease like men. Young women are highly prone to risk of developing cardiovascular disease in this modern day lifestyle. Hence this study was undertaken with the objective to study the prevalence and risk factors of cardiovascular disease among the selected young women, develop a Heart Health Risk Assessment Index and assess the risk for cardiovascular disease among young women and promote suitable intervention strategies and evaluate the impact in reducing the risk for cardiovascular disease.

The methodology for the study was carried out in four phases. In phase I, the prevalence of cardiovascular disease among women was studied in two multi specialty hospitals at Coimbatore district, Tamil Nadu for a period of six months. The risk factors associated with the disease among the selected population was identified. A well designed interview schedule was formulated to elicit details on the socio-economic status, disease profile, dietary and lifestyle pattern. Anthropometric details, blood pressure and lipid profile was assessed for all the women with cardiovascular disease.

In phase II, assessment of risk for cardiovascular disease among selected healthy population was done among women in the age group of 21 to 40 years. Five hundred employed and 500 unemployed who had no known history of cardiovascular disease were selected using stratified sampling. Five hundred women employed in two private textile mills, Bharat Sanchar Nigam Limited (BSNL), Police Recruitment School (PRS) and two Business Process Outsourcing (BPO) at Coimbatore. Five hundred unemployed women from the residential urban areas of Coimbatore were selected based on convenience sampling.

A Heart Health Risk Assessment Index (HHRAI) was developed to assess the risk for cardiovascular disease among the young women aged 21 to 40 years.
The criteria in the HHRAI comprised the non-modifiable factors namely age, family history of the disease. Modifiable factors such as Body Mass Index, Waist to Hip Ratio and blood pressure were a part of the HHRAI. Dietary pattern such as type of diet, type of fat and oil consumed, amount of fats used, consumption of foods rich in fibre, snacks and junk foods, coffee and salt intake were included. Exercise pattern, yoga and meditation, stress pattern and type of personality were the criteria’s for lifestyle pattern. The HHRAI comprised of 16 criteria to assess the risk for cardiovascular disease.

The component which was normal without risk was given zero. The score for the component with low risk was three and the medium risk was allotted five scores. The highest score ten was awarded to the component with the highest risk. An overall score of 48 and less was categorised as low risk. Scores from 49 to 80 was categorised to be medium risk category and scores from 81 to 160 to be the high risk for cardiovascular disease. The Heart Health Risk Assessment Index was validated statistically using correlation analysis and was compared with standard risk predictor developed by Framingham Cohort Studies Adult Treatment Panel III, 2005. The sample adequacy and most significant contributory factors for cardiovascular disease was interpreted with factor analysis.

In phase III, therapeutic lifestyle intervention was promoted for women with high risk for cardiovascular disease. The interventions were diet, weight and stress management. For diet supplement, three recipes namely porridges, soups and cookies were developed. The recipes were standardised and evaluated for acceptability by a 30 member panel. The product, cookies which was rated with the highest overall acceptability was finally selected for the diet intervention. The diet management consisted of a dietary supplement, cookies was given as a midmorning and evening snack to the women. In addition to the supplement, emphasis on balanced diet, role of fibre, antioxidants, type and quantity of fat to be consumed was imparted through diet counselling. A booklet on “Guidelines for Healthy Heart” with details such as general guidelines for health, risk factors, diet modifications, cooking methods, planning menus, need for regular exercise, stress management and one hundred heart friendly recipes.
Weight management include work out of women at gym for 30 minutes everyday. Women worked out with the equipment such as tread mill for lower body and cardiac strength for six minutes. In the elliptical fitness exerciser, the work out was for three minutes and pedelar for four minutes to strengthen calf and thigh muscles. Rowing to strengthen arms, cycle to relax lower body, twister to hip muscles, strength routine for muscle group namely biceps, triceps, spinal region and abdomen stretching machines for stretching and relaxing muscles for 20 minutes with four minutes each.

Stress management was given in two modules with yoga as module I and positive therapy as module II for group III women for a period of four months. Module I comprising yoga classes were conducted by a yoga expert. Women performed yoga for 30 minutes every day for four months. Module II, was conducted twice a month with the components of positive therapy including deep breathing exercises, auto suggestions for positive thoughts, counselling, tension releasing exercises including smile therapy and laughter therapy.

The interventions were single approach method and combination approach methods. Women with high risk, scores above 81 were selected for the intervention. A total of 168 young women were divided into seven groups with twenty four women in each group. Six groups were treated as experimental groups and one group (seventh) was control. For the single approach method groups I, II and III were given diet management, weight management and stress management respectively. For groups IV, V and VI combination intervention method was adopted namely diet and weight management, diet and stress management and diet, weight and stress management were given respectively. For group VII, no intervention was adopted.

In phase IV, the impact of therapeutic lifestyle modification was studied for changes in the risk scores of Heart Health Risk Assessment Index, blood pressure and lipid profile at pre and post intervention. The serum biochemical inflammation markers of cardiovascular diseases such as homo cysteine, C reactive protein and lipase A was analysed for a sub sample of six women each in Group I, IV, V and VI at pre
intervention and post intervention period using standard procedures. Since the groups I, IV, V and VI were given two or three intervention strategies, these groups alone were tested for the serum biochemical inflammation markers.

**The findings of the study are**

**PHASE I**

- The prevalence of cardiovascular disease among the women of the two hospitals showed that 12.1 per cent women were affected with cardiovascular diseases and among this 20.7 per cent were young women.

- Coronary artery disease like angina pectoris, myocardial infarction and arrhythmia were noted among the older age group (97.5 per cent).

- The educational status of the women points out that the highest per cent of illiterates (50.5 per cent) were in the age group above 60 years and the highest percent of literates were in the 21 to 40 year group.

- Among the 1461 women, 681 women were housewives and the others were engaged in agriculture, business, clerical and blue collar jobs or retired.

- A period of less than five year duration after the diagnosis of the disease was seen to be the highest among 21 to 40 years (53.5 per cent), 70.7 per cent and 61.7 per cent among 41 to 60 and above 60 year age groups respectively.

- Angioplasty was the major treatment offered for the women with 38.6 per cent women in the 21 to 40 years, 32.5 per cent women in the 41 to 60 years and 53.3 per cent women in the above 60 year age group.

- Women with a positive family history of cardiovascular disease were 29 per cent among the total population. Above 50 per cent in each age group were found to have either their father or mother suffering from cardiovascular disease.
Diabetes was an associated complication for cardiovascular disease among 362 women. Hormonal disorders such as thyroid dysfunction and polycystic ovaries were other health problems noted among the women.

The Body Mass Index revealed that in 21 to 40 year category, 23.7 per cent women were at risk of obesity and grade I obesity was noted among 29.4 per cent women.

Waist to Hip Ratio above 0.8 was seen among 91.4 per cent of the young age group, 94.7 per cent in the 41 to 60 year age group and 92.5 per cent above 60 years.

Pre hypertension was noted among 65.6 per cent of 21 to 40 years, 39.8 per cent of 41 to 60 years and 24.3 per cent of women above 60 year women age groups.

Elevated lipid profile namely total cholesterol, triglycerides and low density lipoproteins was noted among 99.5 per cent women. All the women were at the risk levels of high density lipoproteins.

The type of diet followed by the women showed that 689 women were non vegetarians, 736 women were vegetarians and 36 women were ova vegetarians.

The mean nutrient intake of the women showed that there was a deficit in the intake of nutrients such as carbohydrate, beta carotene, vitamin C and fibre.

The intake of vegetables among the women showed that 11.3 per cent, 3.9 per cent and 3.7 per cent women in the three different age groups respectively consumed vegetables rarely.

The consumption pattern of fruits showed that 58.4 per cent, 62.5 per cent and 53.8 per cent women were in the 21 to 40 years, 41 to 60 years and above 60 years respectively consumed fruits rarely.
Toned milk was consumed by 52.1 per cent, 54.3 per cent and 41.4 per cent women in the three age groups respectively.

Sunflower oil was the common oil used among 80 per cent of the women.

Consumption of fleshy foods were seen among 772 women. The consumption pattern of meat was the highest with 83 per cent followed by chicken 66.6 per cent and fish only by 59.1 per cent women.

The consumption pattern of snacks showed that 7.3 per cent women in the 21 to 40 year age group, 15.8 per cent of women in the 41 to 60 year age group and 8.1 per cent of women in the above 60 year age group never consumed fried foods.

Only 27.4 per cent women were found to perform exercise or indulge in meditation. Among the two form of activities, the young age group performed exercise comparatively lower than the middle aged and above 60 year age group ie., 12.5 per cent as against 58.5 per cent and 29 per cent.

PHASE II

A positive family history for cardiovascular disease was present among 37 per cent women. About 16.4 per cent employed and 32.2 per cent unemployed were with high risk for cardiovascular disease with first degree family history.

Pre hypertension was noted among 26 per cent employed and 44.8 per cent unemployed women. Mild and moderate hypertension was observed among 12.8 per cent employed and 17 per cent unemployed women.

Grade II obesity categorised as high risk for cardiovascular disease was noticed among 9.2 per cent employed and 15.2 per cent of the unemployed women.

A Waist to Hip Ratio more than 0.9 indicating high risk was noted among 194 employed (38.8 %) and 248 unemployed (49.6 %).
Non-vegetarianism with consumption of meat, fish and poultry were found predominant among 31.2 per cent employed and 60.8 per cent unemployed women and were at high risk for cardiovascular disease.

The use of fats and oils among the women revealed that 70.2 percent employed and 74.4 per cent unemployed women and were at medium risk as they used either monounsaturated or polyunsaturated fats.

The quantity of the fats and oils consumed by the women showed that 22.8 per cent employed and 37.8 unemployed women used more than 30 grams of fats and oils per day indicating high risk for cardiovascular disease.

The consumption of foods rich in fibre showed that the intake of vegetables was rare among 1.2 per cent employed and 3.6 per cent unemployed women and fruits by 16.6 per cent employed and 27.2 per cent unemployed women and were at high risk for cardiovascular disease.

The consumption of fried, fast, baked foods and carbonated beverages revealed that fried foods were consumed everyday by 65.2 per cent employed and 56.4 per cent unemployed women indicating high risk for cardiovascular disease.

Coffee consumption among the women showed that forty one per cent employed and 51.4 per cent unemployed women were at high risk as they consumed coffee more than 5 cups a day.

The use of more than ten grams of salt everyday by 5.6 per cent employed and 26.2 per cent unemployed women were seen due to the reason of using papads, pickles and dry preserves in the menu.

The mean nutrient intake of the high risk women showed an energy deficit of 286 calories. The fibre intake was very less and was only four grams per day.
The data on physical activity showed that a large proportion of women with 59.6 per cent employed and 86.2 per cent unemployed women did not do any regular exercise indicating high risk.

The meditation practices adopted by the women showed that 70.8 per cent employed and 76.8 per cent unemployed women were at high risk with no habit of meditation.

Moderate stress was found among 69.2 per cent employed women indicating excessive work load and 20.4 per cent unemployed women indicating heavy house hold chores.

The type of personality behaviour indicated that 29.2 per cent employed and 27.6 per cent unemployed women were at high risk for cardiovascular disease with type D personality type.

The Heart Health Risk Assessment Index (HHRAI) was validated with correlation and factor analysis. The results showed that non-vegetarian foods, amount of fats, snacks and carbonated beverages, blood pressure, exercise, high stress, foods less in fibre, Waist to Hip Ratio, family history and meditation were the most significant contributory factors for cardiovascular disease.

**PHASE III**

Single and combination approach methods were adopted for therapeutic lifestyle intervention. Diet, weight and stress were planned for the intervention.

For diet management, three diet supplements such as porridge, soup and cookies were tried and the cookies had an overall higher acceptability. The nutritional contribution of the cookies was 401 kilo calories meeting 21 per cent of the day’s total calorie requirement. The protein content was 11.3 grams meeting 22.6 per cent of the total requirement for a day.
The microbial quality of the supplement showed that the total viable count at room temperature was within the standard limits on initial, 5 days, 10 days and 15 days.

For weight management, the women worked out in gym for 30 minutes everyday. Stress management was given in two modules with yoga as module I and positive therapy as module II.

PHASE IV

- Single approach method, Group I diet management showed that a one per cent level significance was noted for Body Mass Index, Waist to Hip Ratio, triglycerides, total cholesterol, low density lipoproteins and risk scores. The changes in the Body Mass Index showed a difference of four kilograms in the weight of the women.

- Weight management (Group II) with intervention of regular aerobic exercise among the women showed a mean weight reduction of five kilograms during the intervention period with 1.5 kilograms each for the first two months and one kilogram for the next two months.

- Group III with stress management showed that the weight reduction in these women was at an average of four kilograms during the intervention period.

- Combination approach method, diet and weight management group (Group IV) showed that all the parameters had significance at one per cent level revealing the positive impact of improving the health of the women. The mean weight reduction showed a reduction of 5.5 kilograms over the intervention period.

- Diet and stress management had significance at one per cent level for Body Mass Index, Waist to Hip Ratio and risk scores. There was a weight reduction of four kilograms among the women during the intervention period.
The intervention group of women with all three strategies namely diet, weight and stress management showed that the mean weight reduction was five kilograms.

The group VII with no intervention (Control) showed a meager difference in body mass index (0.20) and no change in the waist to hip ratio. The lipoproteins namely triglycerides, total cholesterol, very low density lipoproteins increased during the intervention period.

The ANOVA results showed that mean BMI values do not differ significantly among the groups. The other criterias showed a significant difference at one per cent level.

ANACOVA, the test to check whether the covariate term (Initial) has any significant effect on the final values and after removing the co – variate effect, showed one per cent significant difference in final values among the groups.

The post hoc test, least significant difference (LSD) result showed that group IV, diet and weight management group differed most significantly at five per cent level followed by group VI, diet, weight and stress management.

The serum biochemical inflammation markers C reactive protein, homo cysteine and lipase levels were within the desirable limits and showed a gradual reduction during the intervention

CONCLUSION

The prevalence of cardiovascular disease among young women and the Heart Health Risk Assessment Index among healthy young women population showed alarming results. Intervention strategies like a combined approach of diet and weight management by the young age groups will help in the primary prevention of cardiovascular disease. Simple dietary and lifestyle changes are highly important in today’s modern lifestyle and adoption of these will help to keep young women healthy.
SCOPE FOR FUTURE RESEARCH

- Longitudinal studies can be conducted for a larger group of women.
- Heart Health Risk Assessment Index (HHRAI) can be developed for male population to assess the risk at an early age.