Summary and Conclusion

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Over the years, India has earned the dubious distinction of being the cardiovascular disease capital of the world. More people die annually from cardiovascular disease than from any other cause. An estimated 17.3 million people died from cardiovascular disease in 2008, representing 30 per cent of all global deaths (WHO, 2011). A six fold increase in the incidence of cardiovascular diseases is seen in urban India in the last five decades and a doubling in the prevalence is seen in rural India in the last three decades (Reddy, 2005).

The most important behavioural risk factors of heart disease and stroke are unhealthy diet, physical inactivity, tobacco and alcohol use. Cardiovascular disease is largely preventable. Both population wide measures and improved access to individual health care interventions can result in a major reduction in the health and socioeconomic burden caused by these diseases and their risk factors. At present, public health services in developing countries are overstretched by increasing demands to cope with heart disease involving huge amounts of resources, and budgets. This is translated into enormous medical and health-care costs. Health promotion efforts to combat this burden are therefore imperative. As a result, a large proportion of people with high cardiovascular risk remain undiagnosed, and even those diagnosed have insufficient access to treatment at the primary health-care level while evidences suggest that two-thirds of premature deaths due to non communicable diseases including cardiovascular disease can be prevented by primary prevention of these risk factors (WHO, 2011).

From this perspective, functional foods can be seen as a strategy to cope up with disease prevention. Overwhelming data from epidemiological and clinical trials indicate that plant based foods can reduce the risk of chronic diseases. Exploring more on these lines may shed some light on the innate value of such functional foods and aid in reaping maximum benefits for future.

The present study entitled **'Development and Evaluation of Functional Food Mixes on Adults with Cardiovascular Diseases and Impact of Diet Counselling'** was undertaken with the following objectives to

- Develop functional food mixes for cardiovascular disease
- Evaluate the food mixes developed in terms of acceptability and nutrient content
- Assess the nutritional status and blood parameters of selected adults with cardiovascular diseases
- Supplement the diets of selected adults with the mixes for a period of six months
- Evaluate the effect of the developed food mixes using various parameters
- Evaluate the impact of diet counseling on adults with cardiovascular disease using various parameters

Six functional foods namely wheat germ, green gram, amla, carrot, drumstick leaves and flax seed were chosen based on their hypolipidimic, hypoglycemic and antioxidant properties. Green gram was germinated, carrot was shredded, and amla was deseeded and cut. Green gram, carrot, amla and drumstick leaves were shade dried. These four ingredients were then powdered and mixed in the ratio of 2:2:1:1. This formed the basic mix for supplementation. Variation I and II were developed by adding wheat germ and flax seed powders to the basic mix in the ratio of 4:1. The food mixes were analysed for their nutrient content and microbial count. Fourteen food preparations were prepared incorporating 30 g of each food mix to one serving of the preparation. The food mixes and recipes were evaluated by a panel of 30 trained members using five point scale score card.

A total of 1640 adults aged 40 to 65 years with cardiovascular diseases were recruited from six hospitals specialising in cardiovascular disease in Madurai city. The protocol was presented and approved by Avinashilingam University's Ethical Committee. Background and disease related information were collected using a developed pretested interview schedule. Anthropometric parameters namely height, weight, BMI, waist circumference,

hip circumference, waist hip ratio and waist height ratio were measured for all the adults using standardised procedures. Clinical signs and symptoms with relation to cardiovascular disease were diagnosed among the adults with the help of a physician. Fasting blood sample was drawn from the adults and assessed for glucose and lipid profile for all the adults and glycosylated haemoglobin levels for the diabetic adults. Food and nutrient intake of the adults were assessed by 24 hour dietary recall method. Total energy expenditure of the adults was assessed following the procedure recommended by ICMR (2002). The energy balance of the adults was subsequently calculated. Cardiovascular parameters such as resting heart rate, blood pressure and electrocardiogram were assessed for all the adults.

From 1640 adults, a total of 160 adults were selected for supplementation based on their willingness to cooperate. The adults (120) were divided randomly into four groups of 30 adults each namely EG1, EG2, EG3 and CG1 respectively supplemented with basic mix, variation I, variation II and control group without any supplementation. A total of 90 adults were selected with cardiovascular disease along with type II diabetes mellitus and divided randomly into two groups of 30 each namely EG4 and CG2 respectively supplemented with basic mix and without any supplementation.

The adults were asked to consume 30g of food mix each day for a period of six months either separately or along with food by mixing it with different preparations. The supplementation was regularly followed up. After six months, the impact was evaluated on the basis of anthropometry (height, weight, BMI, waist hip ratio, waist height ratio), biochemical parameters (lipid profile, blood glucose, HbAIC, serum vitamin A, C and E), cardiovascular parameters (resting heart rate, blood pressure, electrocardiogram and carotid intima media thickness) and performance test (Ruffier's functional test).

In order to improve the awareness about cardiovascular disease among the adults, a diet counselling programme was planned. A total of 90 adults were selected from the initial survey group and divided into three groups namely DCG (counselling alone) and DCSG (counselling and supplementation with basic mix), and control group (CG) who were neither counselled nor supplemented. Diet counselling was imparted using various

audio visual aids (charts, flash cards, pamphlets, booklets, displays and power point presentation) developed for this purpose. The impact of diet counselling was assessed using knowledge scores, healthy eating index, practice index, anthropometry and biochemical estimation.

The salient findings of the present study are as follows.

PHASE I

- The total carbohydrate, protein, fat, fibre and energy content of 100 g of the basic food mix was 60.88 g, 15.26 g, 2.19 g, 1.22 g and 324 kcal respectively, and variation I had 64.72 g, 19.74 g, 2.86 g, 1.08 g and 364 kcal respectively and variation II had 53.81 g, 13.17 g, 3.49 g, 2.01 g and 299 kcal respectively. The content of β carotene, vitamin C and E respectively was 6142 µg, 11.5 mg and 1.745 mg in basic mix, 5967 µg, 10.8 mg and 1.437 mg in variation I and 8213 µg, 11.04 mg and 1.381 mg in variation II.

- The bacteria, yeast and mould counts were found to be below detectable limits in all the three food mixes both initially and after a three months storage period indicating the good keeping quality.

- The total expenditure incurred in the preparation of the food mixes was Rs 31 per kg for basic mix, Rs 44.50 per kg for variation I and Rs 39.50 per kg for variation II. This was comparably more economical and affordable than allopathic medicines and can be easily prepared at home scale.

PHASE II

- Socioeconomic background revealed that majority of the male (33.0%) and female (28.9%) adults have studied up to primary school, while 14.8 per cent of the female adults were uneducated, about 6.1 per cent of males were uneducated. A less percentage of 7.7 were professionals.

- A majority of male adults (25.3%) were engaged in business followed by 22.4 and 21.0 per cent of male adults who were retired from

services or occupied in unskilled work respectively. Majority of the female adults (66.8%) were home makers.

- Majority of the male (81.6%) and female (72.1%) adults participating in the present study were from nuclear families. Small family size of two to four members were seen among 70 per cent of male and 58.5 per cent of female adults, while 25.6 and 32.3 per cent of male and female adults respectively had families with 5 to 7 members.

- Majority of the male (62.8%) and female (78.0%) adults belonged to high income group (HUDCO, 2006) followed by 20.4 per cent male and 13.5 per cent female adults belonged to low income group, while 16.8 per cent of male and 8.5 per cent of female adults belonged to middle income group.

- More than 50 per cent of the adults followed sedentary activity pattern. Moderate activity was seen among 33.7 and 23.4 per cent of male and female adults while only less than ten per cent of the adults followed heavy activity pattern.

- Among 1640 adults studied, 48.2 per cent male and 61.8 per cent of the female adults had hypertension without any other cardiac complications. About 26.9 per cent of male and 18.1 per cent of female adults had ischemic heart disease. Myocardial infarction was found among 19.1 per cent male and 16.7 per cent female adults. Coronary artery bypass graft had been performed on 5.8 per cent of the male and 3.4 per cent of female adults. Among all the adults, 34 per cent of the male and 23.3 per cent of the female adults had diabetes along with cardiovascular disease.

- Among the various symptoms of cardiovascular disease, breathlessness, lack of appetite and heart burn were most common among the adults of both sexes. Inability to work and palpitation were also reported to be of frequent occurrence. Other symptoms included shivering, giddiness, chest or shoulder pain, oedema, vomiting and profuse sweating.

- Only 21.5, 33.7 and 17.1 per cent of the adults reported that none of the members of their families had hypertension, hyperlipidemia and diabetes mellitus respectively. However, among the other adults, there was reported prevalence of these diseases in their family history.

- Majority of the male (77.6%) and female (90.7%) adults did not do any exercise. Yoga was practiced only by 6.4 per cent of male and 9.3 per cent of female adults. About 7 and 14.2 per cent of the male adults were frequent smokers and alcohol consumers and only 11.0 and 4.3 per cent of male adults had discontinued smoking and alcohol consumption respectively upon doctor's advice. About 37.5 per cent of male and 35.6 per cent of female adults had the habit of chewing tobacco.

- While only 10.3 and 8.8 per cent of the male and female adults respectively were vegetarians, 68.4 and 73.2 per cent of the male and female adults respectively were non vegetarians. Some male (6.5%) and female (10.8%) adults had changed to vegetarianism after diagnosed of cardiovascular disease. Irregular meal pattern and frequent fasting were also noted among the adults. Among the non vegetarians, 21.6 per cent of male and 25.5 per cent of female adults consumed non vegetarian foods 5 to 7 times a week. Deep frying was the most common cooking method among 46.8 per cent of the male and female adults.

- Out of the 1640 adults surveyed, 80.3 per cent used refined oil as the major cooking oil. Groundnut oil and gingelly oil were also used frequently by the adults. Rice bran oil was used among 7.5 per cent of the adults. The daily visible oil intake among 21.3 per cent of male and female adults ranged from 71 to 90 g per day which is more than the ICMR recommended allowance of 15 g per day. Only 20.9 per cent of the adults consumed 10 to 30 g of oil per day.

- Food intake data revealed that there was a 41.8 per cent and 27.7 per cent higher intake of cereals among the male and female adults respectively in comparison to the RDA (ICMR 2009). The pulse intake

of male and female adults was less than the RDA by 1.3 and 18.3 per cent respectively. The intake of leafy vegetables and other vegetables were short of the recommended levels by 62 per cent among the female adults and the intake of milk and its products exceeded the recommendations by more than seven per cent in both sexes. The intake of fats and oils exceeded RDA by as much as 188 and 152 per cent among male and female adults respectively.

- The energy intake of the male and female adults exceeded their respective RDAs by 17.9 and 8.1 per cent. There was also an alarmingly high intake of fat ranging from 112.5 per cent to 93.5 per cent in both male (42.5 g/d) and female adults (38.7 g/d) as against the recommended levels (20 g/d). However, the adults also failed to meet the requirements of protein, beta carotene, iron, vitamin C, folic acid and calcium.
- Both male and female adults spent majority of their time and energy in sedentary activities. The total daily energy expenditure of the male and female adults was found to be 2545 Kcal and 2147 Kcal respectively.
- A comparison of the energy intake and expenditure among the adults revealed that both the male (189.2 Kcal) and female (94.6 Kcal) were in a state of positive energy balance with their energy intake exceeding its expenditure.
- The mean weights of the male and female subjects were 79.95 and 71.9 Kg and their BMI was 30.61 and 30.3 respectively. The waist hip ratio of the male and female adults was 1.0 and 0.96 respectively, waist height ratio was 0.65 and 0.63 respectively, and the mid upper arm circumference was 29.55 and 31.25 cm respectively.
- Based on BMI, majority of the male (34.9%) and female (38.4%) adults were seen to be pre obese. More than 50 per cent of the adults had abdominal obesity based on their waist circumference and waist hip ratio with the percentage greater among the women than men.
- Total cholesterol levels of the male and female adults were 240.9 and 273.04 mg per dl respectively. The triglyceride levels were 180.84 and

165.38 mg per dl, HDL cholesterol was 35.8 and 43.11 mg per dl, LDL cholesterol was 169.97 and 174.74 mg per dl and VLDL cholesterol was 35.85 and 30.77 mg per dl for the male and female adults respectively.

- According to the lipid profile suggested by NCEP (2001) very few adults (11.5%) had desirable levels of total cholesterol. A total of 33.4 and 40.7 adults had borderline and high triglyceride levels. The "good cholesterol" HDL was seen to be low among more than 75 per cent of the female and more than 80 per cent of the male adults. Less than ten per cent of the adults maintained optimal levels of LDL cholesterol and an alarmingly high percentage of male (70.5%) and female (73.3%) adults had high serum LDL cholesterol levels.
- The average heart rates of the male and female adults were 72.41 and 71.3 beats per min. The mean systolic blood pressure of the male and female adults was 143.76 and 146.61 mm Hg and the diastolic blood pressure was 95.11 and 94.08 mm Hg respectively. A total of 21.41 per cent of the adults had systolic hypertension, 17.5 per cent had diastolic hypertension and 42.25 per cent had both the types of hypertension.
- The mean heart rates of the male and female adults were 72.41 and 71.3 beats per min which were within normal levels. Both the systolic and diastolic blood pressures of the adults were more than the NCEP (2001) guidelines.
- Only 18.54 per cent of the adults had normal blood pressure levels at the time of study based on the WHO (2001) classification. About 37.5, 30.6 and 13.4 per cent of the adults had pre, stage I and stage II hypertension respectively based on the JNC (2004) classification.
- Resting ECG analysis revealed the absence of any form of abnormalities among 71.2 and 82.9 per cent of the male and female adults. Q-wave abnormalities were identified among a total of 15.6 per cent of the adults. S-T and T-wave abnormalities were present among 3.2 and 2.7 per cent of the adults respectively. Arrhythmias were

noticed in the ECG of 10.8 per cent of male and 8.5 per cent of female adults.

- About 28.5 per cent of the adults had any three abnormalities out of the five abnormalities of metabolic syndrome. It was encouraging to observe that only 7.6 per cent of adults had all the five abnormalities of metabolic syndrome.

PHASE III

- After supplementation the mean body weights of the adults belonging to all the four experimental groups showed a reduction by 2.05, 2.03, 2.27 and 1.17 kg respectively among EG1, EG2, EG3 and EG4 groups which were found to be statistically significant at one per cent level. A comparison of the effect of supplementation of food mixes between the experimental groups revealed that maximum weight reduction was observed in EG2 closely followed by EG1 and EG3.

- After the supplementation, the adults belonging to EG3 group recorded the maximum reduction in BMI by 0.94 followed by EG2 with 0.90 and EG1 with 0.83 which were seen to be significant at one per cent level. On the whole, nine adults moved to normal BMI from other categories among all the supplementation groups. The number of adults from at risk group also reduced by two and from obese I group reduced by seven.

- The supplementation programme was effective in cutting down the waist circumference by 0.40, 0.23 and 0.37 cm among the three experimental groups. In the case of the diabetic experimental group a reduction of 0.17 cm was observed. The reduction in waist circumference was statistically significant at one per cent level among all the three cardiovascular disease groups EG1, EG2, EG3 and at five per cent level among the diabetic group EG4.

- Supplementation of food mixes to the experimental groups over a period of six months resulted in a gradual but significant (1% level) decrease in the WHR by less than 0.01. A maximum reduction of 0.004 was observed among the flax seed mix supplemented group. Both the

control groups did not change from the initial WHR measurements highlighting the significance of food mixes supplemented to the experimental groups.

- Supplementation resulted in a gradual reduction in waist height ratio of the adults which was statistically significant at one per cent level but no change was observed among the control groups CG1 and CG2. All the three mixes were almost equally effective in reducing the waist height ratio of the adults.
- With regard to total cholesterol in all the experimental groups supplementation resulted in significant reduction with a maximum decrease in group EG3 followed by EG2, EG1 and EG4.
- Supplementation of the functional food mixes reduced the triglyceride levels among all the experimental groups and significant at one per cent level. There was also a reduction in the triglyceride levels of the control groups CG1 and CG2, however, the reduction was very less when compared to the experimental groups.
- Experimental group supplemented with flax seed food mix (EG3) recorded the maximum reduction in LDL cholesterol levels by 30.1 mg per dl followed by wheat germ food mix group (28.47 mg/dl) and the basic mix group (18.34 mg/dl). The diabetic group recorded the least reduction in LDL cholesterol levels (13.99 mg/dl) amongst the four experimental groups. The reduction in LDL levels among all the four groups was seen to be significant at one per cent level.
- The serum VLDL cholesterol levels of the adults reduced due to supplementation by 4.42 mg per dl in the EG1, 4.67 mg per dl in EG2, 7.27 mg per dl in EG3 and 3.73 mg per dl in EG4 with a maximum reduction in group EG3 followed by EG2 and EG1. The differences were found to be statistically significant at one per cent level.
- Supplementation also resulted in a significant increase in the HDL cholesterol levels of the adults by 3.13, 3.20, 5.03 and 2.57 mg per dl respectively among groups EG1, EG2, EG3 and EG4. This increase

was statistically significant at one per cent level. However, control groups recorded an increase which was not statistically significant.

- Supplementation resulted in a reduction in fasting blood sugar levels by 4.20, 4.07 and 4.40 mg per dl respectively among the groups EG1, EG2, and EG3. A maximum reduction was observed among the hyperglycemic group EG4 supplemented with basic mix with a decrease of fasting blood glucose levels by 10.93 mg per dl.

- The mean glycosylated haemoglobin levels of the adults belonging to the experimental group with diabetes (EG4) reduced by 0.44 per cent while that of the control group recorded a low difference of 0.01 per cent.

- At the end of supplementation, the group supplemented with the basic mix (EG1) evidenced a maximum increase in the serum vitamin A levels by 2.85 µg per dl. This was followed by the wheat germ incorporated food mix group EG2 with an increase of 2.16 µg per dl followed by the flax seed incorporated food mix supplemented group (EG3) with an increase of 1.75 µg per dl. The diabetic group EG4 recorded an increment of 1.72 µg per dl. However, the increment was least among the two control groups CG1 and CG2.

- After supplementation the increase in vitamin C levels evidenced by the experimental groups were 0.73, 0.32, 0.42 and 0.55 mg per dl among EG1, EG2, EG3 and EG4 respectively which were found to be statistically significant at one per cent level.

- Serum vitamin E levels of the adults with a maximum increase of 0.34 mg per dl in EG1. This was followed by the diabetic experimental group EG4 with an increase of 0.31 mg per dl, EG3 with an increase of 0.29 mg per dl and EG2 with an increase of 0.21 mg per dl.

- The systolic blood pressure of the adults belonging to groups EG1, EG2, EG3 and EG4 reduced by 0.67, 4.00, 3.33, and 1.33 mm Hg respectively and diastolic blood pressure by 0.67, 2.00, 1.67 and 1.00 respectively. It was seen that variation I and II supplementation resulted in a greater reduction in systolic blood pressure than basic

mix, however all the mixes were similarly effective in reducing the diastolic blood pressure levels of the adults.

- The percentage of adults with normal blood pressure increased from 8.3 to 12.5 in the supplementation groups and a very slight change in stage I and stage II hypertension.
- Carotid Intima Media Thickness of the adults before and after supplementation revealed that there was a marginal reduction in the CIMT by 0.1 mm among the two adults each belonging to groups EG2 and EG3 respectively.
- The functional capacity of the adults belonging to group EG3 showed a maximum improvement due to supplementation with a difference of 0.54 followed by EG1 (basic mix) with a difference of 0.51, EG2 (wheat germ) with a difference of 0.49 and EG4 (diabetic group) with a difference 0.33.

PHASE IV

- Diet counselling resulted in improving the knowledge scores of the adults by 28.53 and 29.15 per cent among both the counselled groups DCG and DCSG with a significant (1% level) difference.
- After diet counselling the Eating Index significantly improved in both the experimental groups by 19.75 per cent in DCG and by 18.18 per cent in DCSG. However the control group evidenced only a slight improvement in Eating Index.
- After diet counselling, Practice Index improved significantly (1% level) by 20.75 and 26.50 per cent among DCG and DCSG respectively. Comparison between the groups revealed that the Practice Index of group DCSG was significantly greater (1% level) than DCG.
- Diet counselling resulted in a reduction in body weight of the adults in group DCG by 1.28 kg while combined effect of diet counselling and supplementation resulted in a greater reduction of body weight among adults in group DCSG by 2.18 kg. The decrease was significant at one per cent level among both the groups compared with control.

- After diet counselling, the BMI levels decreased in both DCG and DCSG groups by 0.55 and 0.92 respectively, both being significant at one per cent level. However, the control group evidenced a marginal reduction in BMI by 0.08 significant at five per cent level.
- Experimental groups DCG and DCSG showed a decreasing trend in WHR with diet counselling and supplementation which was found to be statistically significant at one per cent level compared to the control group. A favourable statistically significant decrease was also observed in the WHtR of the adults belonging to groups DCG and DCSG.
- As a result of diet counselling, the total cholesterol levels decreased by 18.47 mg/dl. Combined effect of diet counselling and supplementation resulted in a much greater reduction of 25.8 mg per dl. This resulted in a shift of the mean total cholesterol levels of the adults from 'high' to 'boderline high' based on the NCEP (2002) guidelines.
- Both the experimental groups also revealed statistically significant reduction in triglyceride levels. While diet counselling resulted in a reduction of triglyceride levels by 12.2 mg per dl, diet counselling coupled with supplementation resulted in almost doubled reduction (23.63 mg/dl).
- The mean LDL cholesterol levels of the adults reduced by 10.86 mg per dl and 24.9 mg per dl among the two experimental groups DCG and DCSG respectively. As in the case of VLDL cholesterol, the ECSG group evidenced a reduction of 4.37 mg per dl while the DCG group evidenced a reduction of 2.44 mg per dl. While both the groups evidenced a reduction of one per cent statistical significance, the control groups evidenced only marginal reductions.
- Diet counselling along with supplementation resulted in a maximum increment in HDL cholesterol levels by 3.83 mg per dl, followed by diet counselling with an increment of 2.83 mg per dl. Both the groups showed a statistically significant difference at one per cent level. The increase in control group was marginal and statistically insignificant.

On the whole, analysis of the developed functional food mixes for their nutrient content, acceptability and microbial count revealed that the mixes were good sources of fibre and antioxidant vitamins, acceptable for consumption and safe from microbes for up to three months. The food mixes were suitable for supplementation and cheaper in cost than the allopathic medicines prescribed for individuals with cardiovascular disease.

The adults with cardiovascular disease participating in the present study revealed undesirable levels of anthropometric, lipid and cardiovascular parameters. Hypertension, hyperlipidemia and metabolic syndrome coupled with frequent occurrence of cardiovascular disease symptoms were seen to be frequent in this group. These findings were indicative of a poor management of cardiovascular risk factors, and detrimental dietary practices reflecting a need for dietary intervention and knowledge improvement without which there were chances of worsening the disease in future.

Supplementation of the developed functional food mixes to adults with cardiovascular disease provided convincing evidence of the beneficial effects of the supplemented food mixes. The experimental groups demonstrated significant reduction in weight, BMI, fasting glucose and lipid profile and increase in serum antioxidant vitamin levels. A significant reduction in the blood pressure was also observed with improvements in Ruffier's functional test scores. Carotid Intima Media Thickness test results suggested that longer periods of supplementation could yield more promising results towards the benefits of these food mixes against cardiovascular disease. Dietary counselling provided to the adults resulted in improvement in the knowledge of the adults pertaining to cardiovascular disease. Practice Scores and Eating Indices were also improved among the adults. Impact of diet counselling was also projected in the improved anthropometric and biochemical parameters of the adults.

The observations of the present study revealed that these functional foods may have an impact in improving the cardiovascular disease indicators and can be confidently relied upon as an effective supplement in cardiovascular disease management. Modest favourable changes in major cardiovascular risk factors have been shown to significantly decrease

cardiovascular disease and mortality (Hardoon et al., 2008). A continued consumption of these functional foods can therefore result in a more positive shift in the attitude of patients towards food stores instead of completely relying on the pharmacies for remedy.

The results of the study also suggest that counselling improves the perception about disease, diet, and lifestyle changes and thereby control of the complications of cardiovascular disease. With the wealth of talented and skilled nutritionists in developing countries like India, such supplementation and counselling programs if fine-tuned and implemented in cardiovascular disease management programs could definitely have immense impact on the quality of life, giving nutrition an even greater place in the medical management of cardiovascular disease.

RECOMMENDATIONS

The recommendations for future studies are

- ✓ Identification and supplementation of other functional foods influential in cardiovascular disease management.
- ✓ Including diet counselling as a regular part of clinical treatment schedule in hospitals.
- ✓ Development and comparison of functional food mixes with various other combinations and variations.
- ✓ Developing concentrated forms of functional food mixes with greater storage span and improved flavours using improvised technologies for a greater reach of these foods by people.
- ✓ Impact of supplementation of functional food mixes on other degenerative diseases.
- ✓ Imparting nutrition awareness among the community towards more naturalistic approach for a safe disease management with lesser cost and side effects.