CHAPTER 5
SUMMARY AND CONCLUSION

The study entitled “Development of an Educational Intervention Module for Prevention and Control of Obesity Among Rural Women-A Field Study” is an attempt to study the prevalence of obesity among the rural population and to assess its cause-effect linkages among women in the 35 years plus age group, found to be highly prone to this chronic condition. The overall purpose of the study is to develop an appropriate low cost, non-pharmacological educational intervention module for control and management of obesity in the rural socio-cultural set-up through field experimentation among a highly motivated group of obese women.

The intervention focused on nutritional and health empowerment of a group of obese women through practice based learning sessions to modify their diet and activity pattern and to perpetuate the same through peer group and family support. Monitoring and evaluation were the integral components of the module.
Objectives of the study

The Overall objective of the study is to develop an integrated location specific educational intervention module for empowering rural women on obesity and its management.

Specific Objectives:

1. To appraise the prevalence and distribution of obesity among rural adult population in the selected region.
2. To recognize the factors contributing to obesity among the most vulnerable population.
3. To identify the health risks and problems allied to obesity.
4. To design an educational intervention module for improving the cognition levels of rural women on obesity and its management.
5. To experiment the module in a field set up and evaluate its impact.
6. To recommend the module for wider dissemination.

Design of the study:

A quasi experimental design was followed for the study. The study was designed in three phases and was conducted in three hamlets of Athoor panchayat union of Dindigul District. From a random sample of 948 households, 1162 subjects were chosen at random for the Anthropometric survey. Body Mass Index, Waist Circumference and
Waist to Hip Ratio were the three basic anthropometric assessments made to identify the prevalence of obesity among the study population.

Since the rate of prevalence of obesity was found highest among women in the age group of 35 years and above, a detailed health and nutritional survey was conducted among a randomly chosen sub sample of 90 normal and 90 over weight/obese women in this age category to assess their health status and to identify their knowledge and practice gaps in health, nutrition and activity pattern. Based on the information elicited, an integrated educational module on lifestyle modification for management of obesity was developed for the educational empowerment of the group. It was experimented with a group of 30 self selected obese women chosen from one of the study sites with one on one session and group encounters. The impact of the intervention was assessed from the changes in their cognition level - knowledge and practices and variations in obesity parameters.

**Findings:**

The age of the adult population covered by the anthropometric survey ranged from 18-85 years with the mean of 40.29 years. More than half (58 percent) of the families were Below the Poverty Line with annual family income below Rs.20, 700/-. 
As per the current definition for Asian Indians (BMI >23-25 Kg/m²), the prevalence of overweight was higher among males (18.1%) than females (12.5%) and obesity (BMI >25 Kg/m²) was vice versa, higher among females (21.3%) than males (18.1%). By the international criteria for obesity (BMI >30kg/m²), the prevalence rate of obesity was 7.9 percent among males and 12.5 percent among females. Most of the obese women were unemployed housewives (37.7%) in the high income category (48.6%) with annual family income above Rs. 50,001/-.

Abdominal obesity was predominantly noticed among women in the age group of 35 to 60 years. Early forties was found to be the most vulnerable period of weight gain and the post hoc multiple comparison test showed that obesity was predominant in middle aged persons (35-60 years) and overweight among younger age groups (<35 years).

A significant difference was noticed in the obesity parameters; Body Mass Index, waist circumference and waist hip ratio of all the three age groups (18-35 years, 35-60 years & above 60 years). However by gender, the differences in BMI were not significantly different but the waist circumference and waist hip ratio were significantly different.

234
The health / nutrition and physical activity survey revealed that the waist circumference (28.9 percent) and waist to hip ratio (65.6 percent) were at-risk levels in quite a number of women in the normal category though their BMI and body fat percentages were within the normal limits. On the other hand, the waist circumference (91.1 percent) and waist to hip ratio (83.3 percent) of a majority of the women in the at-risk category of over weight or obese group were at risk level indicating coexistence of abdominal or central obesity with general obesity. One half of these women were with percentage of body fat at risk levels.

The mean comparison of the anthropometric, bio-physical and biochemical indices of the normal and at-risk women revealed significant differences in their BMI, waist circumference, hip circumference, and body fat percentage. However, no significant differences were found in their waist hip ratio, systolic blood pressure, diastolic blood pressure, haemoglobin, fasting blood glucose and total cholesterol levels.

A significant correlation was found between BMI and the waist circumference, hip circumference and body fat percentage of the subjects. However, with waist hip ratio and other bio-physical and biochemical variables, BMI was not significantly associated.
Higher tendency of familial inheritance of obesity was found among women in the at risk category. Most of the women started to gain weight after 35 years of age and consequent to child birth (37 percent and 41.1 percent respectively).

Diabetes, Hypertension, Osteoporosis and Arthritis were the known chronic diseases among women in both the groups. Hypertension and Arthritis were reported by 13.3 percent and 8.9 percent women in the normal and at-risk categories respectively. A few (4.4 percent) of them were hypertensive patients. Diabetes was a common complaint of a few women in both normal and at-risk categories (8.9 percent and 4.4 percent respectively).

A large proportion of women in the at risk group complained of musculoskeletal problems like back pain, body pain, joint pain and leg pain and their proportion was comparatively low among women with normal BMI. Irrespective of their BMI status, women experienced health problems like palpitation, giddiness, breathlessness, chest pain, numbness in hands and legs, fatigue and weakness. The other health problems reported by the women were heaviness, ulcer, and stress and strain. Watching TV, prayer, sleeping, chatting with friends and reading books were their popular stress relaxation techniques.
Most of the respondents were non vegetarians. Their mean intake of cereals, pulses, milk, flesh foods, added sugar and oil and calorie dense foods like sweets, fried foods, and baked foods, other snacks and roots and tubers were relatively higher for the women in the at-risk category than that of normal women.

No significant difference was noticed in the mean consumption of sweets, fried foods and baked foods by the normal and at-risk women whereas the intake of roots and tubers was relatively higher among women in the at-risk category than that of the normal women and significantly different.

The distribution of the total and proportionate calorie intake pattern showed a slight difference between women in the normal and at-risk categories. Women in at-risk level showed a relatively higher amount of calorie intake from carbohydrate and fat than the normal women.

Total dietary fibre intake ranged from 15-25 grams for two thirds of the women in the normal and at-risk categories. However, no significant difference was noticed in the mean intake of fibre rich foods of normal and at-risk women.
The mean comparison of the nutrient intake of normal and at-risk women revealed no significant differences in their intake of carbohydrate, protein, saturated fatty acids, total fatty acids, vitamin A, vitamin B2, vitamin E, soluble fibre, insoluble fibre, total dietary fibre, sodium and iron whereas the intake of energy, fat, MUFA, PUFA, omega 3 and omega 6 fatty acids, vitamin B1, calcium, zinc, chromium, folic acid and arginine showed significant differences between the two groups.

There was no significant correlation between BMI and the daily intake of calorie dense foods like sweets, bakery items and other snacks and fibre rich foods like green leafy vegetables, other vegetables and fruits but with consumption of fried items and roots and tubers, a significant correlation was found.

A significant correlation at .01 level was observed between BMI and the intake of nutrients like MUFA, omega 6 fatty acids and chromium. A correlation at .05 level was observed between BMI and intake of PUFA, omega 3 fatty acids, vitamin B1, iron, zinc and folic acid. However no significant correlation was found between BMI and the intake of energy, carbohydrate, protein, fat, saturated fatty acids, total fatty acids, vitamin A, vitamin B2, vitamin E, soluble, insoluble and total dietary fibre, sodium, calcium and arginine.
Physical activity level of a majority (73.3%) of the women in the normal category were at sedentary level where as 33.3 percent and 40 percent of them in the at-risk category were with sedentary and limited / moderate level of physical activity respectively.

The mean comparison of Metabolic Equivalents (METs), Basal Energy Expenditure(BEE), Total Energy Expenditure (TEE) and Physical Activity Level (PAL) between normal and at-risk categories showed that the BEE, TEE and PAL values were significantly different for the two groups. The mean difference in METs value was however not significant.

A Step-wise Multiple Regression was done to consolidate the variables closely influenced by BMI. By keeping the personal, anthropometric, bio-chemical, bio-physical and dietary factors as independent variables and BMI as dependent variable 11 models were obtained. Hip circumference, MET’s value, total fatty acid, physical activity level, age, hemoglobin and fasting blood glucose level emerged as independent variables to be significantly associated with BMI.
A fair level of cognition of obesity, its causes, discomforts, problems, treatment and prevention was observed in both the groups. However, it required modification with scientific knowledge base leading to practice changes.

The analysis on the whole denoted the need for developing an intensified location specific, socially acceptable and affordable practice based educational programme with scientific explanations for empowering the target group to modify their diet and activity pattern for improving general health and to check adiposity.

On educational intervention, significant differences were noticed in their knowledge levels on self rating of body weight, causes for abnormal weight gain, and diseases due to excess body weight, foods to be included and techniques for preventing obesity. The intervention helped to create awareness, improve knowledge and to apply practices to change their lifestyle.

On intervention, a significant reduction at 1 percent level was observed in the body weight, BMI, waist circumference and hip circumference and WHR at 5 percent level. The knowledge score showed a positive progression at 1 percent level. The difference in mean
knowledge score was significant whereas the mean differences in systolic blood pressure and diastolic blood pressure were not significant.

The cutting of nibbling between meals, restricted use of oil in cooking, reduced purchase of ready to eat foods, increased consumption of fibre rich foods, interest in self appraisal of anthropometric measurements and increase of physical activity were the specific beneficial changes occurred with the educational venture. Improvising family meal pattern, practice of yoga and reduction in the time spent on TV watching were the other beneficial practices picked up by three fourths of the respondents.

The problems enumerated by the respondents in observing the desirable practices were that they could not follow regular physical activity or yoga, could not avoid taking rest / sleep in afternoons and non co-operation of family members. One fourth of the respondents reported criticism from others on practicing yoga/ meditation, and highlighted family interruptions in dietary modifications and tendency to over eating of left over foods as stumbling blocks to their goal achievement. The respondents who underwent intervention have also suggested the need for facilities for assessing body weight and a simple aid for monitoring their weight.
Extension of this education and training to self help group members, ICDS workers and health workers for improving one’s fitness levels through lifestyle modification and exploitation of mass media will ensure sustainability of this educational venture

Implication

- Of the three important anthropometric variables BMI, WC and WHR used in diagnostic surveys of obesity WHR did not show any significant association with obesity. This view has been reported by other researchers (Bao and Wang, 2006; Bose and Chakraborthy, 2005). So it is desirable to avoid this parameter in obesity diagnosis surveys.

- Two critical periods in the life cycle of women for weight gain were the post reproductive period of 35 + and immediately after childbirth. Life oriented education prior to and during these two critical periods is necessary to prevent obesity and its complications among women. Under the on-going nation wide programme of Integrated Child Development Services (ICDS) this component may be added and facility may be extended to women to monitor their weight. The local Primary Health Center (PHC) may come forward to extend needed Pharmacological support.
Weekly Nutrition counseling may also have to be arranged in the PHC.

Conclusion

It is clear from the summation of findings that the study has helped the investigator to give visibility to the problem of obesity among rural population, especially among women in the 35+ age group, its causes, problems and the handy ways to overcome and prevent the same.

On intervention, a significant (P<.01 to P<.05) reduction was observed in the risk factors like body weight, body mass index, waist circumference and waist to hip ratio of the experimental subjects. The knowledge scores of the women increased with intervention. This in turn has lead to significant positive changes in their lifestyle.

Intervention is required at individual and group level to mitigate the problem among women. Impediments from the family and society influence the success of the programme. So due family and social support along with educational empowerment of the women is necessary to ensure sustainability to the lifestyle changes.
Recommendations

Training needs to be given to the health workers at grass root level for diagnosis and management of obesity.

Life style oriented nutrition education may be imparted to the students in the adolescent stage i.e. before the onset of obesity rather than correcting the same at a later period when problems crop up.

Every opportunity for nutritional empowerment of women should be properly used. It can be easily imparted to rural and under privileged women by suitably modifying the organized programme of the self help groups.

Future Studies

Longitudinal studies with more of inter disciplinary input are needed to assess the sustainability of the programme and its impact.

Development of appropriate low calorie fibre rich recipes out of locally available food stuffs, merging the traditional wisdom of the community with scientific base and standardization of the preparations is an added research venture for promoting healthy eating habits.
The link between obesity and micronutrient deficiencies is to be further researched.

Replication of the educational exercise at Village level and development of a micro plan for its implementation at district level involving the local health machinery, the GOs and NGOs involved in health surveillance of the rural community is a follow up work envisaged.

The period of onset of adiposity is to be scientifically examined and apt intervention plan is to be designed for every section of the populations especially the aged and the adolescents.